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9th Year of Publication

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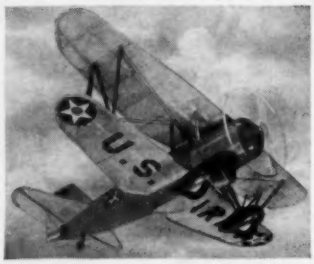

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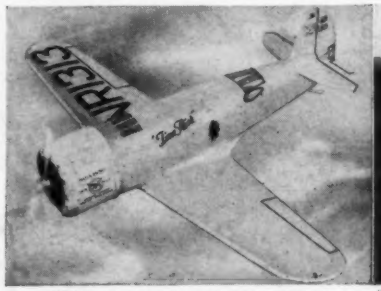

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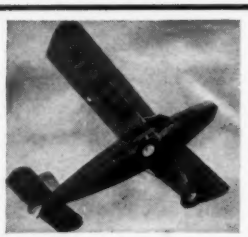

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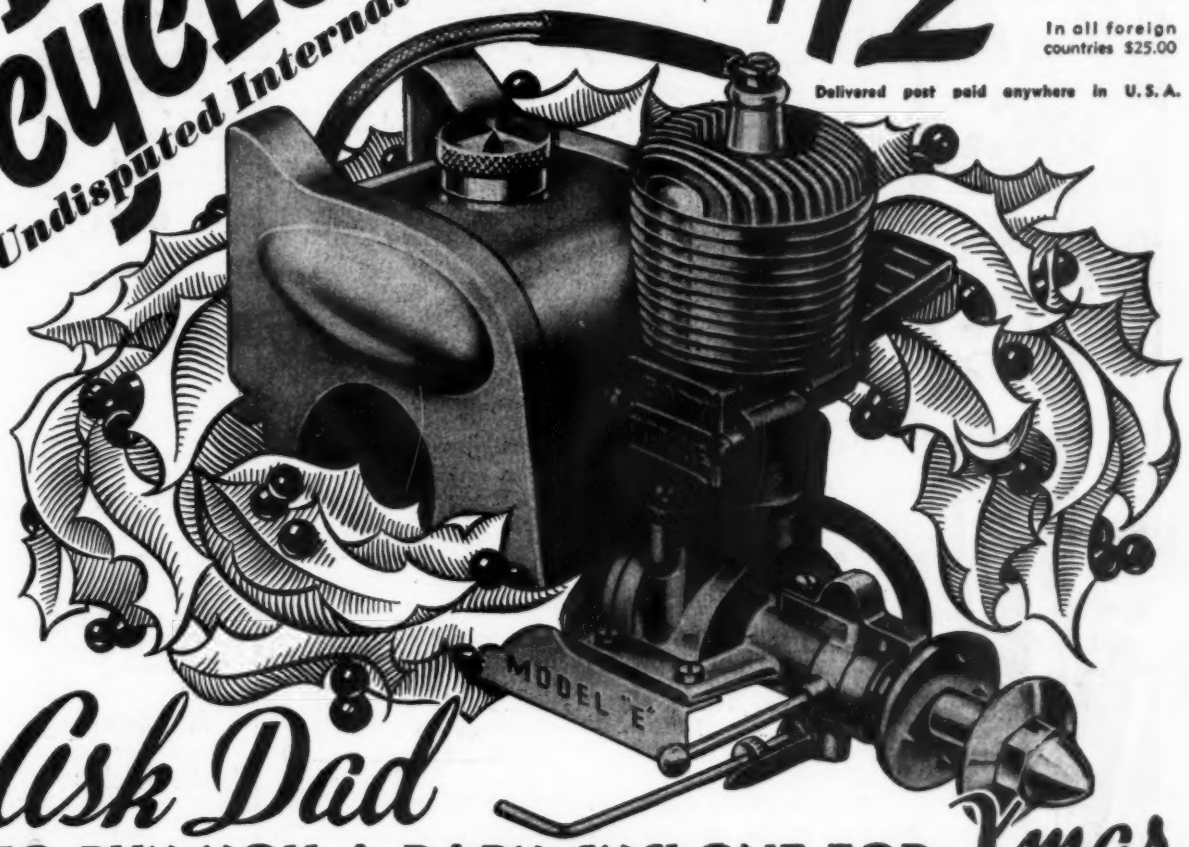

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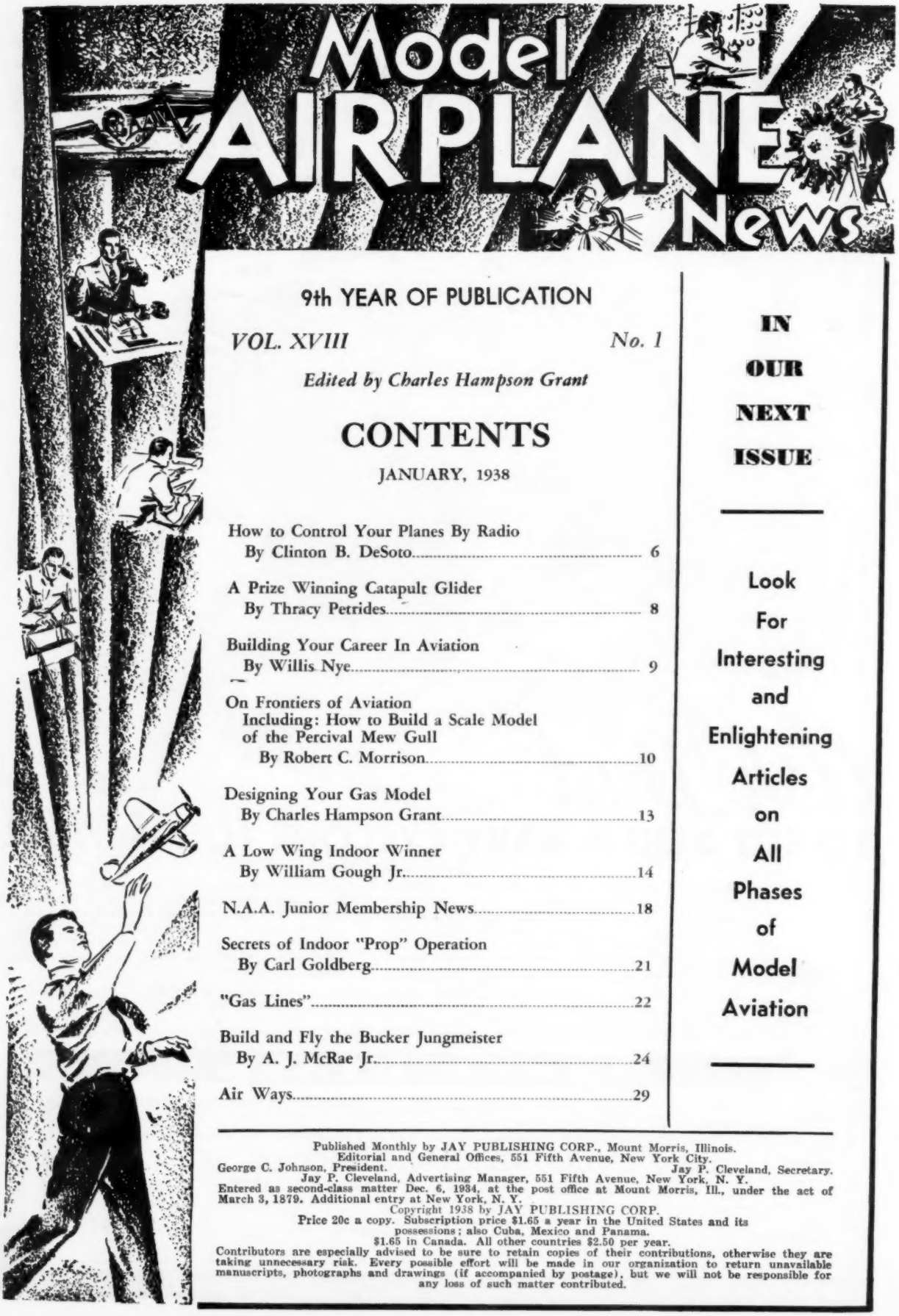

9th YEAR OF PUBLICATION

VOL. XVIII *No. 1*

Edited by Charles Hampson Grant

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JANUARY, 1938

IN OUR NEXT ISSUE

Look For Interesting and Enlightening Articles on All Phases of Model Aviation

Published Monthly by JAY PUBLISHING CORP., Mount Morris, Illinois.
Editorial and General Offices, 551 Fifth Avenue, New York City.
George C. Johnson, President. Jay P. Cleveland, Secretary.
Jay P. Cleveland, Advertising Manager, 551 Fifth Avenue, New York, N. Y.
Entered as second-class matter Dec. 6, 1934, at the post office at Mount Morris, Ill., under the act of March 3, 1879. Additional entry at New York, N. Y.

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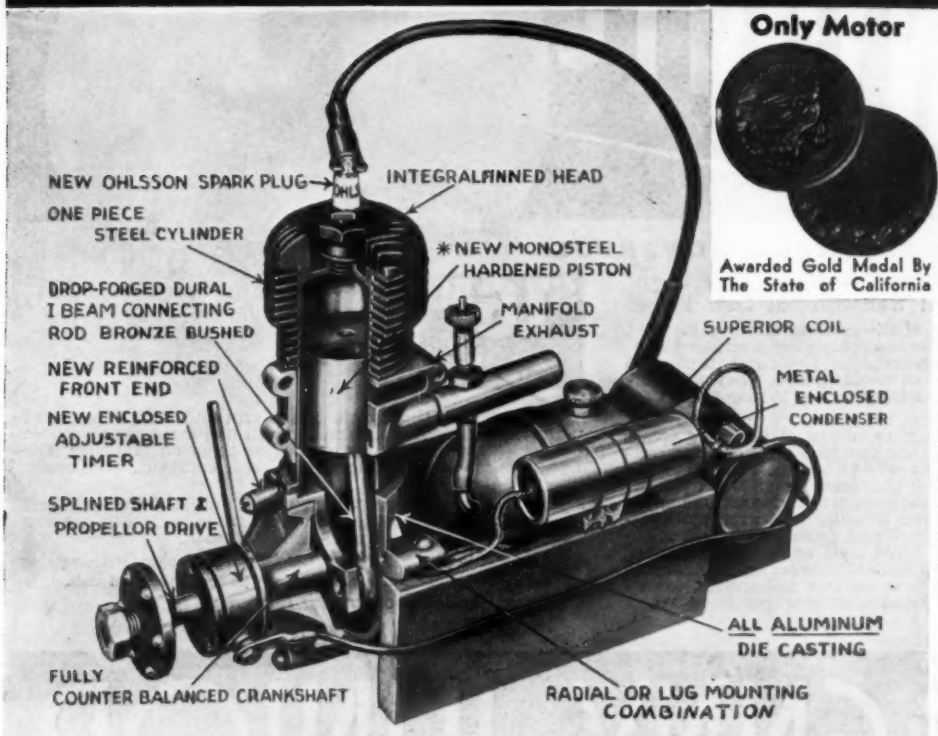

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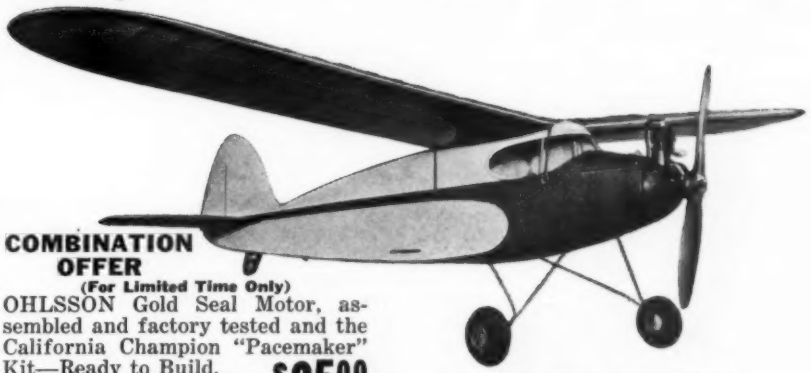

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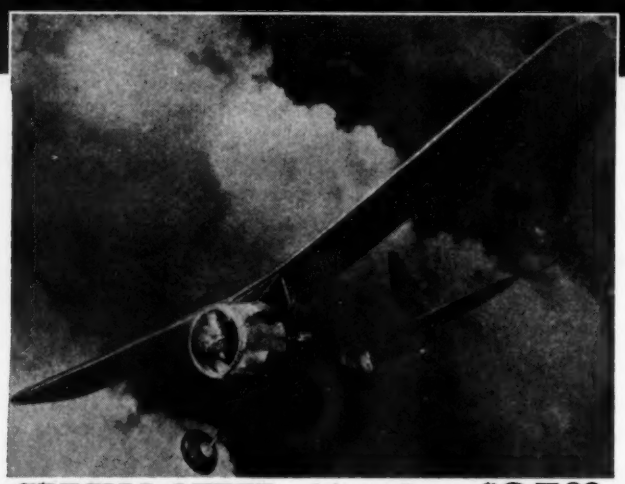

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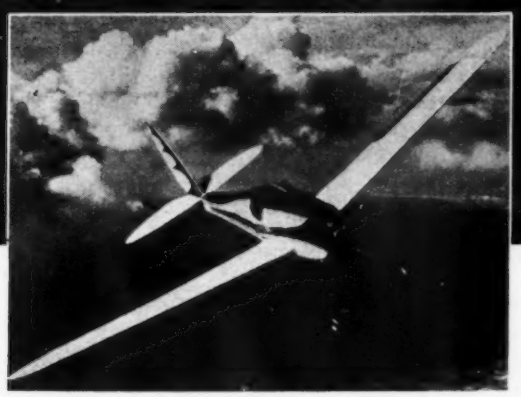

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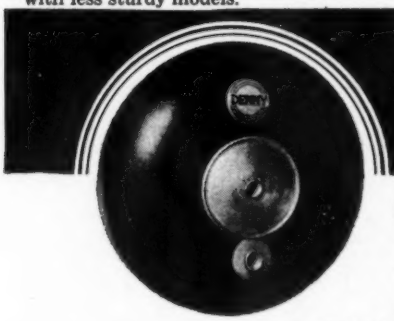

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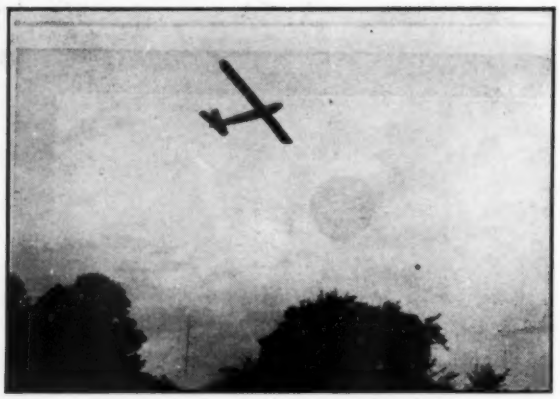


The radio-controlled soarer in full flight

How to Control Your Plane By Radio

How a Radio Amateur and a Model Plane Expert Have Created One of the Most Practical Radio-controlled Planes That Has Ever Flown

By CLINTON B. DE SOTO

RADIO control of model aircraft has long been a vision of great delight to experimentally inclined builders. Its accomplishment in a thoroughly practical and reliable manner has not so far been realized, however. Despite the showing in the number of radio-controlled entries at Detroit this summer, it would be a bold prophet indeed who would predict that in any one of these models lay the end of the search for practical ways and means.

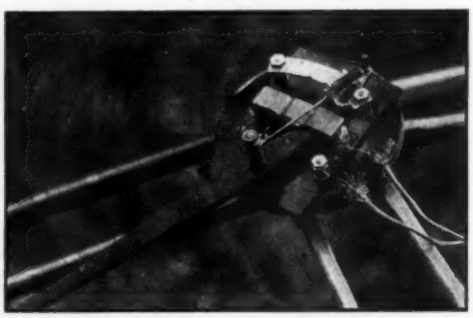
One noteworthy angle on these attempts has been that, for the most part, they represented the work of gas model experts turned radio experimenters. Now a new line of attack has appeared from the opposite quarter. The radio experts of the American Radio Relay League, the national organization of radio amateurs, have been conducting experimental research into the problem at the League's West Hartford, Conn., headquarters during the past summer.

As a matter of fact, this interest on the part of the radio fraternity is especially fitting, since it is only with their cooperation that model builders as a lot can do much with radio control. The operation of any sort of radio transmitting equipment —equally as much that for controlling model aircraft as that for sending voice or code —requires the possession of federal operator and station licenses. And only amateur radio operators, with the exception of those few individuals possessing commercial experimental licenses, are authorized to carry on this sort of work.

The progress that has been made by the A.R.R.L. gang is such that it seems to hold the basis for widespread general investigation of this field in the near future—with building and designing in the coming winter months and actual flying next spring and summer.

To tell the story chronologically, it should be stated that Ross A. Hull, noted ultra-short-wave radio authority and associate editor of "QST" and others of his associates in the League have long experienced a corollary interest in model aircraft. Indeed, Hull is one of the progenitors of modern model building activity, having brought the technique from Australia and introduced it to Hartford and surrounding areas in 1927 through a series of newspaper articles. He has built numerous models and has a sufficient knowledge of aerodynamic theory to qualify him for the present investigation.

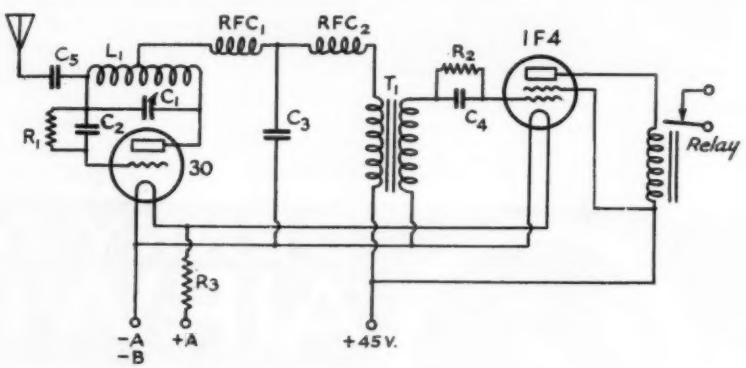
Through the early months of this summer there developed a growing interest in radio control among this group. Tentative control systems were laid out on paper and discarded, the disadvantages of undue weight of complexity being too great. Finally, in late June, the idea for the present system germinated, and work went ahead in earnest. A 2-cylinder Fergusson engine was secured and plans for a 10-ft. gas job laid out. But then, as it usually does, fate stepped in.

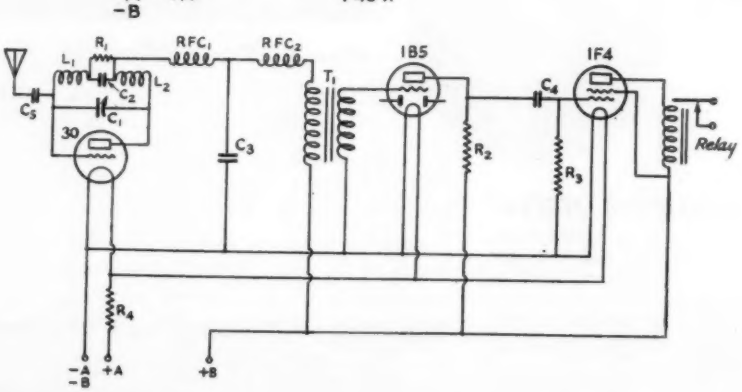


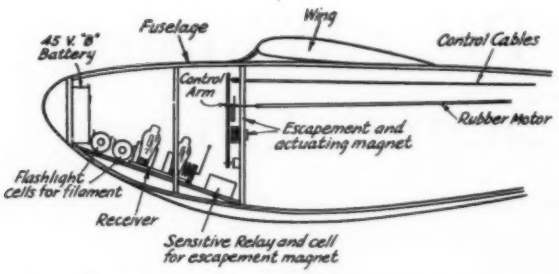
The "rudder stick" by means of which the pilot controls the plane from the ground

In early July Hull and R. B. Bourne, another old-time model builder, made a trip to the National Soaring Meet then being held at Elmira. (A regular practice with Hull, who had first equipped soaring planes with radio for communication back in 1932.) There they found, of all things, a radio-controlled model sailplane, the "Hi-Hat," built by Carl W. Thompson, Jr., of Wilmington, and equipped with radio gear by H. M. Plummer, owner of amateur station W3DIA.

This ship was arranged to fly ordinarily with right rudder and the armature from a telegraph sounder served to give an alternative lef:







A diagram of the control mechanism installed in the fuselage of the model

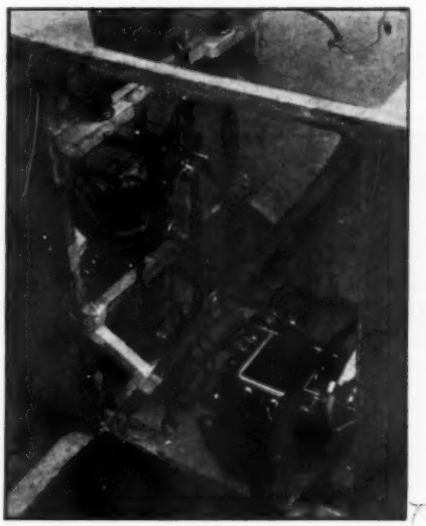
Preparing the soarer and radio control equipment for a flight at West Hartford, Conn.

rudder. The ship made several brief hops before an untimely crack-up ended the experiment. Undaunted, Hull, who visualized how his own system might have functioned under similar circumstances, acquired the remains and brought them back to West Hartford.

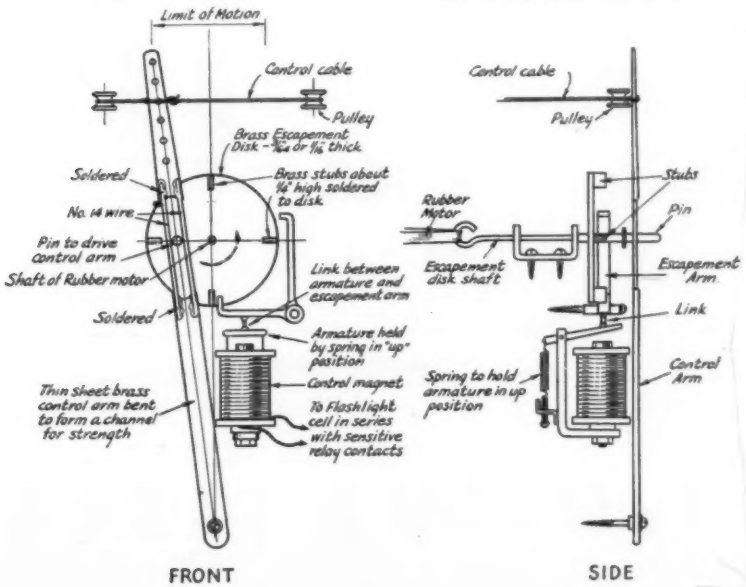
In the weeks that followed he and his group did little but eat, sleep, talk and build radio-controlled model aircraft. Success was not immediate, but it did come—if the present system, crude as it is in comparison with the ultimate goal, can be called success.

The first job was to rebuild the ship. Although not in the high-performance category, it has proved itself a rugged and willing worker. Of 13-ft. span, the wing is in three sections, the tips being from an old gas model of Thompson's augmented by a flat center panel. The rib section is an original, being similar to a Clark "Y" but having the maximum depth near the 40% point. The fuselage is square in section, except for the bottom, which contains a strong "keel" to resist the heavy landing force of a 10-lb. ship. All surfaces are nainsook covered and heavily doped.

Since its first flight with the new radio control equipment in July, this ship has made more than a hundred flights—not without some fifteen crack-ups, but that's the price of progress—and the whole equipment has been rebuilt over and over until there's practically nothing left of the original. The performance of the ship has been demonstrated to many visiting model aviation and radio enthusiasts. including officials of the Soaring Society of America.



Part of the radio equipment and the rudder control device in the model



The times the radio control has failed to function can be counted on the fingers of one hand. Some of the flights have had a duration of several minutes, most of them less; the relatively low gliding angle of the ship and the imperfections of the gliding site have made any real duration almost impossible.

So much for the why and where. Now for the details of the control system that made these results possible.

Like with most good things, simplicity is its keynote. A preliminary examination of the problem made it evident that the traditional control methods—automatic selector switches, electromagnets or electric motors to actuate the controls, and all the rest of it—were impracticable for small aircraft because of their inherent complexity and weight and also because of the additional weight in the heavy batteries required to power these devices.

Even more compelling than these considerations was the thought of all the things that could go wrong with a complicated selector arrangement while in flight, and the havoc that would result through failure. So all these ideas were discarded and a start made at the bottom.

The first step was to choose a rubber band motor to provide the power for control, in lieu of any electrically-operated device. Any model builder knows that a rubber motor will provide more energy per ounce of weight than any other comparable source of energy. A multi-strand motor four or five feet long could be charged with at least a thousand turns, enough for several thousand control motions.

The next step was the construction of a device to trigger off this power and transfer it to the control surfaces at the operator's wish. Again, simplicity was sought. The simplest arrangement that could be found was a plain four-position escapement, rotated by the rubber motor, released one notch at a time by a small electromagnet operated by the radio receiver. This escapement, in turn, moved a control arm which served as a rudder bar.

The whole arrangement is shown in the sketch. Each time the electromagnet receives a pulse from the receiver, the armature depresses, releasing the escapement one notch. As the escapement disc rotates the sliding pin through the rudder bar moves that bar from neutral to the next rudder position. The whole action is simple and positive.

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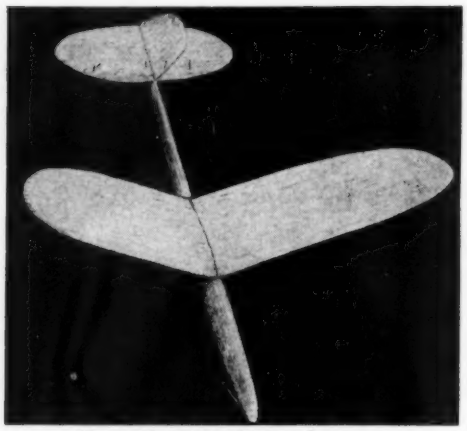

Here's the little ship ready to go

A Prize Winning Catapult Glider

Build This High Performance But Simple Craft and Enjoy a Fascinating Pastime

By THRACY PETRIDES

HERE is an unusual glider; unusual in type and in performance. Catapult gliders are rare on the whole because of the great difficulty involved in effecting a successful design and launch. The difficulty lies in the difference in speeds which the model encounters during the catapulting process. The usual tendency upon launching is for the model to stall or loop due to the increased speed, which speed increase also increases the lift of the wing. In order to counteract this tendency a lifting tail is incorporated which proves most successful. The reason for this is that as the wing lift increases during the launch, the lift of the tail increases simultaneously.

The average altitude is 150 to 200 feet, with a guaranteed duration of one minute average. The original model won a 1937 N. Y. Outdoor Catapult Glider Contest flying for 1' 42.3" without even the aid of any existing thermals. To launch the model, two helpers standing ten feet apart hold 4 strands of 3/16" flat rubber, the left side being held a bit higher in order to secure a right bank.

With regard to the construction, there are no exceptional features not to be found in the average hand-launched glider. The use of extra heavy cement joints cannot be over emphasized, due to the high stresses and strains on all the surfaces and joints. The wing is cut from a piece of 4" wide glider stock, medium-hard grade and is given 3 coats of glider polish. The tail is made of 1/8" sheet balsa with the appropriate airfoil sections worked in. The

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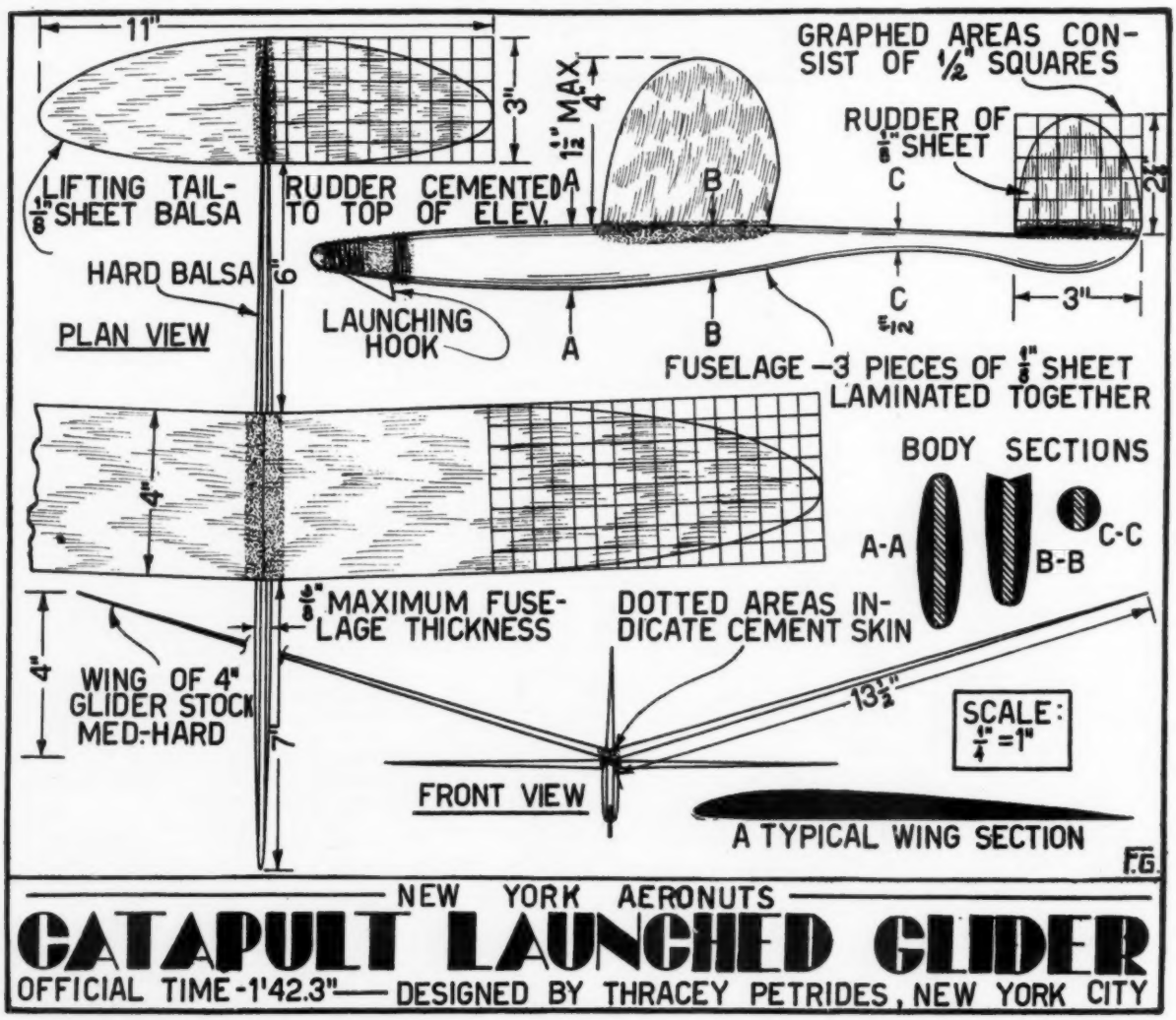

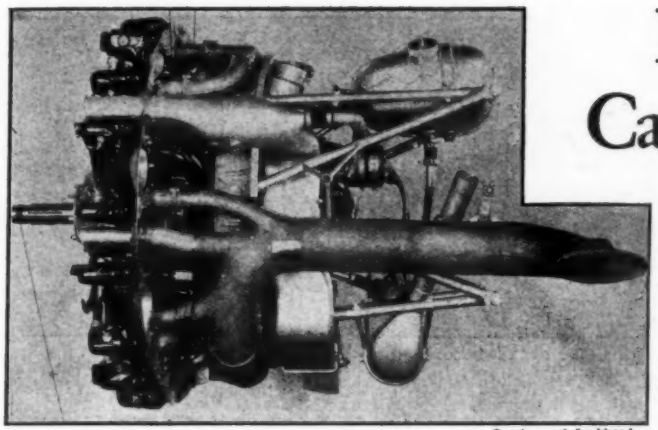

Courtesy of Lockheed

Engine installation of a Lockheed Electra, designed as one component unit

Building Your Career in Aviation

How to Prepare Yourself With Knowledge and Experience for a Successful Life's Work in Aviation

By WILLIS L. NYE

KNOWLEDGE is POWER. That significant theorem remains constant although our social and economic conditions have undergone a transition in which old theories have been discarded as obsolescent in this ever changing world. The youth who seeks a career in the aeronautical industry must have a clear perception and insight to the problems that confront every one who has aspirations. The sources of available material for study are few in this particular field. It is to the student's advantage to know something of what information is available and how it may be obtained.

Advancement in the industrial world is a slow process at best. A definite period of apprenticeship must be served by every one who aspires to work in this field as a means of earning a living. Success only comes to those who have mastered the theory and the practical application of the science of mechanics to the work at hand. The key to any advancement is training and experience. Experience can only be gained by work in this field. Training can be acquired by home study and proper schooling. Specialization in some particular phase of the aircraft industry is the essential point. One cannot hope to know every angle thoroughly as the many ramifications are too complex. The choice of specialization should be made early in the career. Study should then be made of the whole industry. By doing this, a good firm idea can be established as to what the whole picture looks like.

A clear perception of the technicalities of any subject can be gained by study. If your work assignment is driving rivets, learn to drive those rivets better than your fellow worker. Search out in the text books the theory governing riveted joints. This will make your work more interesting and you will understand why such care must be exercised. If your work assignment is fitting design, then do your best to complete the task satisfactorily. If you become puzzled by some technicality, do not hesitate to ask a fellow worker. If he can't help you or does not want to, keep on trying until you find someone who will. Perseverance in every phase is necessary to the complete mastery of any technical subject.

A self analysis will often aid the apprentice in any work. Analyze yourself and find your weak points. Build these weak points up through study or training. If you are a draftsman and your lettering is poor, spend a few extra hours per week in practicing lettering. It will pay dividends. Your superior will often notice the improvement before you do yourself. If your assignment is of technical nature, explore every source of data that is available and related to aircraft and the many kindred subjects which are allied to the industry at large.

The first step in the acquisition of knowledge is to know where the sources of material are and what material is available. For convenience these are listed here:

(1.) The Bureau of Air Commerce Bulletins.
(2) The Air Corps Information Circulars.
(3.) The N.A.C.A. Technical Reports.
(4.) The N.A.C.A. Technical notes.
(5.) The N.A.C.A. Technical Memorandums.
(6) The A.S.M.E. Technical Journals.
(7.) The S.A.E. Journals.
(8.) University Research Reports Covering Aeronautics.
(9.) Current Periodicals at the public libraries.
(10.) Catalogs from the purveyors of aircraft materials.
(11.) Modern text books.
(12.) Factory trade organs.
(13.) Design Handbooks of the Army and Navy.

The publications of the U.S. Bureau of Air Commerce number 30 various booklets. These booklets can be secured by application to the Washington, D.C., office without cost. The publications cover a variety of subjects from rules and regulations to design data.

The Air Corps Information Circulars are confidential and only issued to persons connected directly with military aircraft design, universities and factories. Some older copies are available free upon application to the War Department.

The National Advisory Committee for Aeronautics is the source of aeronautical intelligence in the United States. A list of the Technical Notes, Technical Reports and Technical Memorandums is issued free upon application to their office in Washington, D.C. Technical Reports are for sale by the Superintendent of Public Documents, Government Printing Office, Washington, D.C. The other types of publications are loaned or sent to interested persons by the committee upon application.

The American Society of Mechanical Engineers and the Society of Automotive Engineers have special articles which deal with aircraft printed in their journals from time to time. These journals are available at public libraries.

University reports are issued by the schools of mechanical engineering at the respective universities. These reports are

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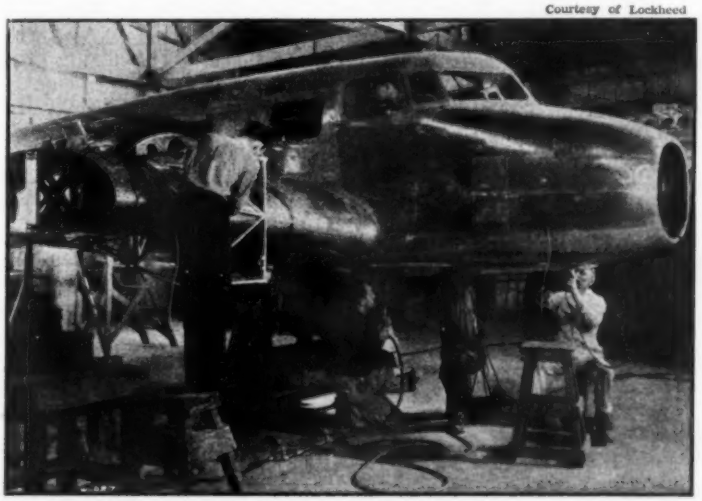
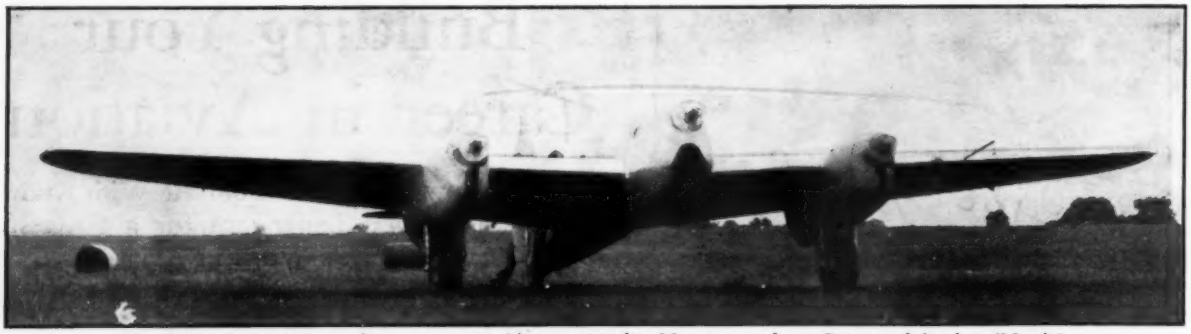
Courtesy of Lockheed



Metal workers assembling one of the Lockheed Electras at the factory. At the left the mounting for an engine is being prepared



The Bellanca 28-92 long distance racer with two 250 hp. Menascos and one Ranger of 420 hp. (Martin)

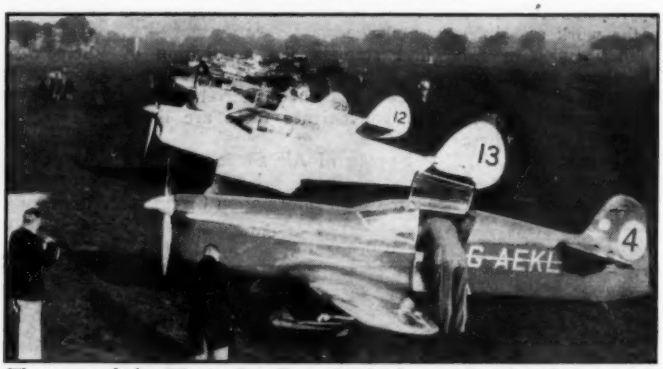
On Frontiers of Aviation

Highlights on the Latest Aviation Developments Throughout the World—How to Build a Scale Model of the Percival Mew Gull

By ROBERT C. MORRISON

ONE likes a good argument occasionally and there is probably no better subject on which to start one than "which country has the best airplanes?" We need not say who we think has the best airplanes as apparently such an argument has already begun, judging from the letters from the patriotic minds of England. We have not counted them, but we know we have thrown more bouquets towards English aircraft than we have cabbages, but as yet we have only received replies to our cabbages. Apparently there are still people in England who think their aircraft superb over all others, which of course indicates a commendable patriotic spirit. However we appear to have the jump on those on the other side of the big pond for if we get stumped on a question we can always pull out one of those masterpieces like von Kármán's in the February issue of the Journal of Aeronautical Sciences and leave them in confusion for hours on end.

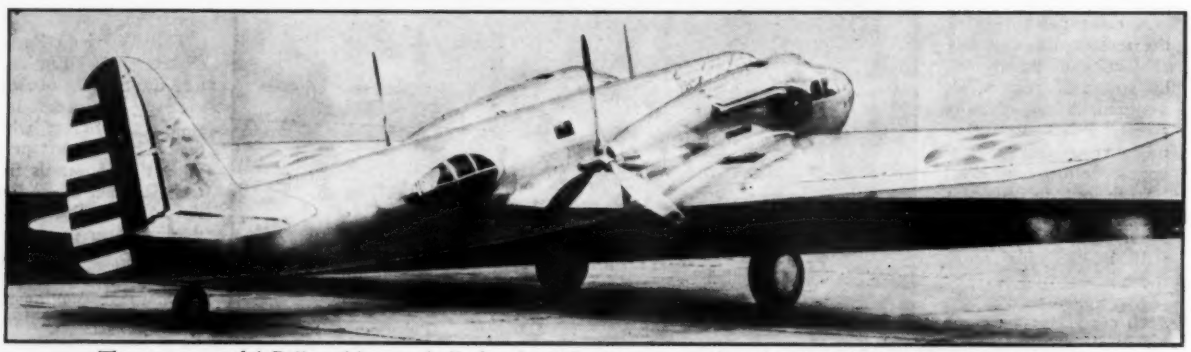
The huge Russian plane lost in the Arctic while on a flight from Moscow to Alaska. (Sovfoto)



The start of the King's Cup Race, England; won by the plane in the foreground at average speed of over 200 miles per hour. (Globe)

There is a certain prominent man in England whose pet hobby at present is to bring out the fact that the Short flying boats (the new Empire jobs) have their wings set in the hull while ours are still mounted on turret structures and was the first one over there to mention that the new Navy Sikorsky copied the idea. Apparently he was not aware that Douglas produced a big Navy boat with the wing set in the hull before the first Short ship ever left the water and has already forgotten that the Douglas DF followed the Shorts by only a couple of months with the same feature. Incidentally the construction of the Short boats has all the ear marks of being American, and if it were not for the American controllable pitch propellers, their take-off run would be so long that they would probably not get off the water until they reached the Azores on an England-U.S. flight.

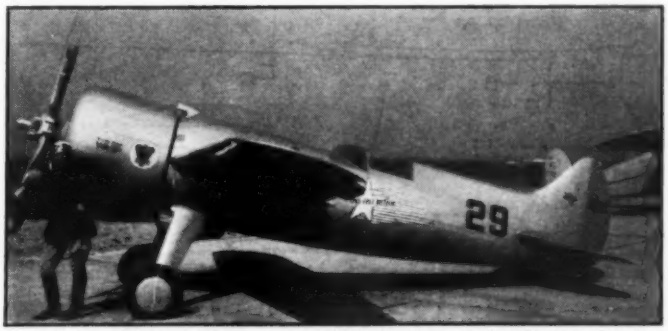
It hurts when some country says they have much better planes than we, especially when the



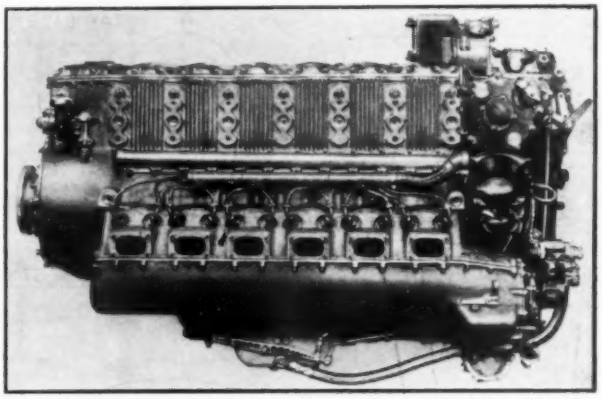
The new powerful Bell multi-seater built for the U.S. Army to combat the giant "flying fortresses." (Acme)

The Short-Mayo composite aircraft. The large plane lifts the smaller heavier craft into flight. (Globe)

success they have had has been due to design features developed by us. Outside of Handley Page slots and flaps there is not one major contribution made by England in the last few years that has improved the efficiency of modern aircraft in a practical manner. Who was it that made the first practical use of the retractable landing gear and tail wheel, streamlined tires, controllable pitch props, cowl cooling flaps, servo and control tabs, N.A.C.A. 23012 wing section series, commercial use of 100 octane fuel, turbo superchargers for every-day military use, present day all-metal construction, the split trailing edge flap, and a host of others including the more recent nose wheel and supercharged cabins for high altitude flying both commercially and military? While England is just beginning to reap from the benefits of trailing edge flaps we have squeezed all the efficiency we can get out of them and may soon discard them entirely for better proven devices. The nose wheel has reached such widespread success that there is little doubt that the tail wheel will be obsolete within a very few years in this country.



Col. Roscoe Turner's latest racer which he flew at the Cleveland 1937 Air Races at more than 300 m.p.h. (Morrison)

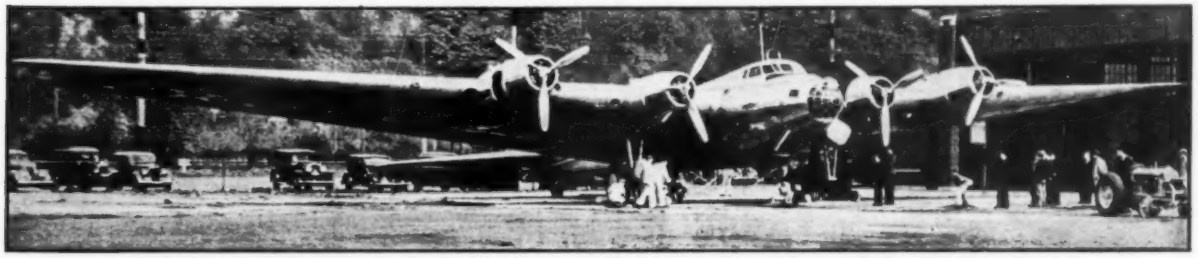


The 680 hp. Jumo 210 V12 engine used extensively in German aircraft. (Morrison)

In the matter of aircraft engines England has more to stand on but to take a look into the situation we will take one of her best, the Rolls-Royce Merlin. How does it compare with the Allison V-12? The Merlin can deliver from 1,035 to 1,050 hp. at take-off and normally puts out 990 hp. From all we can gather at present the Allison just produces a good old 1,000 hp. at some time or other, but we know that it can still "bat a 1,000" as high as 25,000 feet, as it is easily adaptable for supercharging while a Merlin in a Fairey Battle produces its 990 hp. at 19,000 ft. The Allison only has a loading of 1.28 lb. per hp. while the Merlin is something around 1.37 lb. per hp. with normal hp. rating. But we are not putting our chest out. We are just merely wondering where England can get that "superior" performance from. Now that we have heard of these whiz-bang speeds of certain foreign aircraft we would like to know how this speed is produced before we make any remarks about it being applesauce.

Right now in England the first airplane with a nose wheel is strutting its own. It is the Arpin designed on the same principle as the Stearman-Hammond but perhaps in a slightly lower priced field. Dimensions are, span, 31 ft. 6 in.; length, 23 ft. 2 in.; height, 7 ft. 1 in.; and wing area, 165 sq. ft. It has a top speed of about 108 m.p.h. and lands near to 35 m.p.h.

So many more important racing events have happened that we have not had room to make comment on the Paris-Damascus



The largest land plane, the Boeing XB-15 bomber with 150 ft. span and four 1000 hp. engines. (Acme)

Race. There is not much to say though as three Italian Savoiss placed one, two, three at an average of 218, 213, and 212 m.p.h with a DeHavilland Comet fourth at 195 m.p.h., a Fulger fifth at 182 m.p.h. The Caudron Typhon that managed to enter quit at the half-way mark and a gargantuan four-engined Farman floated along the course until it was forced down by bad weather.

The forthcoming Deutsche de la Meurthe Race in France may produce some excitement this time. It is not much fun watching an air race with no airplanes in it so the officials have decided to reduce the maximum allowed displacement of engines from 8 liters to 6½ liters. Thus airplanes of smaller horsepower will feel willing to compete with the idea that they may win a prize or two. With

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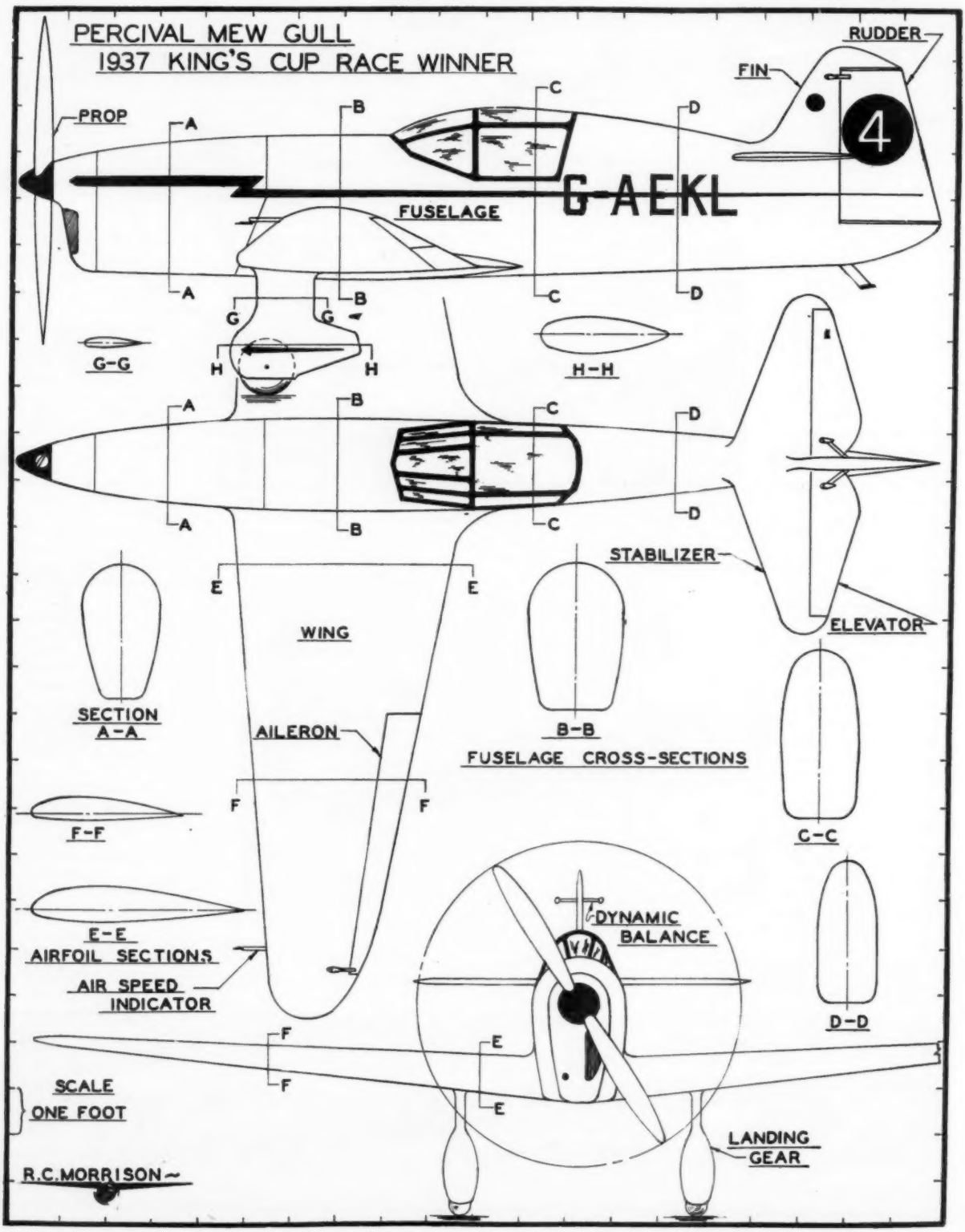


Designing Your Gas Model

Chapter No. 5

The Type of Performance That Is Required and How to Arrange the Flight Forces So Complete Stability Will Result

Article No. 69

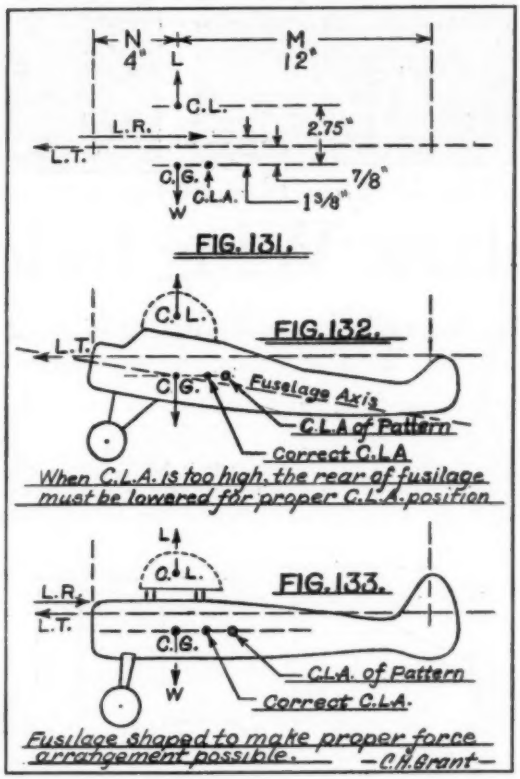
By CHARLES HAMPSON GRANT

IN PAST pages of this series of articles all the factors have been discussed which are required to make your gas model stable and efficient. In order to be assured of the success of your plane they must be applied to its design in a manner that will contribute to the fulfillment of the purpose for which your craft in intended.

Therefore the first step is to establish a clear conception in your mind of the purpose of the plane to be designed and the type of performance you wish it to have. Once this has been done, the factors of design may be applied so as to insure the physical characteristics that will produce the desired result.

Unlike rubber-powered models, gas models when they hit the ground usually strike with sufficient force to demolish themselves, unless they retain normal flight attitudes on such occasions and land in an orthodox manner. This is due to their greater weight and speed compared to rubber-driven planes. it is imperative therefore that the first consideration should be the stability of the craft when laying out the design of your ship.

The first flight of a gas model is often the last one unless the degree of stability is such that it will successfully overcome some possible misjudgment in the adjustment of the wings or tail surfaces. Perfect adjustment usually does not characterize a first flight but develops through corrections made after several trial flights.



So we may say that the purpose of the gas model designer is to build an exceptionally stable plane that will fly consistently and which at the same time will be proportioned to fly for as long a time as possible with a minimum amount of fuel. Briefly the gas model should be an extremely stable duration plane.

Now in order to get a clear picture of what your plane should be, you should visualize it in terms of performance. This will give you a key to its proportions and the required arrangement of forces. In other words you should determine its performance specifications.

The complete plane in all its details probably cannot be pictured in your mind accurately at first. The conception of the model grows gradually as one after another the considerations or steps of design are taken up. Any preconceived idea of the plane's proportions would probably be inaccurate. Once the desired performance has been established it will indicate through the rules of design, how the plane should be proportioned in its physical aspects. Let us consider the quality of performance most desired in a contest gas model. Perhaps this will indicate some of the physical and mechanical characteristics the plane should have.

First of all, it should fly as slowly as possible. Not only greater power efficiency and duration will result from this, but a slow flying plane never jars the nerves to the same extent as a fast one, when it crashes. There are usually fewer spare parts to pick up. In addition it should be stall-proof and spin-proof. Above all it should possess that elusive quality, discussed in the preceding article, spiral stability. This characteristic also endows the craft with qualities which make it immune to wind and gusty air conditions.

Next, what qualities will give duration? We know that duration results from a fast climb and a low sinking velocity. In light of these facts the most important consideration is the weight of the ship. This affects the performance to a greater degree than anything else. For any given wing area and power the model should be as light as possible. A light model will have a light wing loading (pounds per square foot of wing area). Therefore it will not only fly slowly, with fewer crackups, but will have a rapid climb and a low sinking velocity. Consequently the duration of flight will be greater than it will be if the plane is heavily loaded. A loading of one-half pound per square foot of wing area is extremely low. Such a model should give remarkable performance if designed correctly in other respects. An average wing loading is ¾ pound per square foot, while one pound per square foot may be considered a heavy wing loading and will contribute to high speed.

The speed of a plane loaded to ½ pound per square foot of wing area will be between eighteen and twenty-two miles per hour when in normal flight. The exact speed of the plane within this range will depend on the power and wing section employed. A plane loaded to ¾ pound per square foot will fly between twenty-two and twenty-seven miles per hour. Loaded with one pound per square foot of wing area a model will fly at a rate of 25.5 to 30 miles per hour in slow normal flight without excess power for climb. The level flight speed of any gas model with average climbing capacity may be figured approximately by the following formula: (Solve for V.)

$$L = (0.002)\ \frac{(3C^u + C^B)}{4}$$

$$\text{times } A \cdot V^2\ \frac{(4+I)}{6}.$$

In the formula, L = Lift or weight of the model in ounces; C^U = the height of the upper camber divided by the wing chord; C^B = the height of the lower camber divided by the chord. (Camber is measured from the chord line. Negative, or downward camber of undersurface is zero). A = the wing area in square inches; V = the speed of the plane in miles per hour; and I = the angle of incidence of the wing. (This angle is measured relative to the line of thrust.)

By making the wings large compared to the rest of the ship and of high aspect ratio, a light wing loading as well as high efficiency will be assured.

This leads us to another consideration that affects the performance of a plane to a great extent; i.e., power loading. This is the number of pounds of airplane weight per horsepower developed by the engine. The power loading should be as high as possible, for the more power that is developed compared to the weight of the plane, the greater the rate of climb will be with any given wing area. Therefore by lightening a plane of given wing area and engine power you not only decrease the speed and sinking velocity by decreasing the wing loading, but you are increasing the rate of climb by decreasing the power

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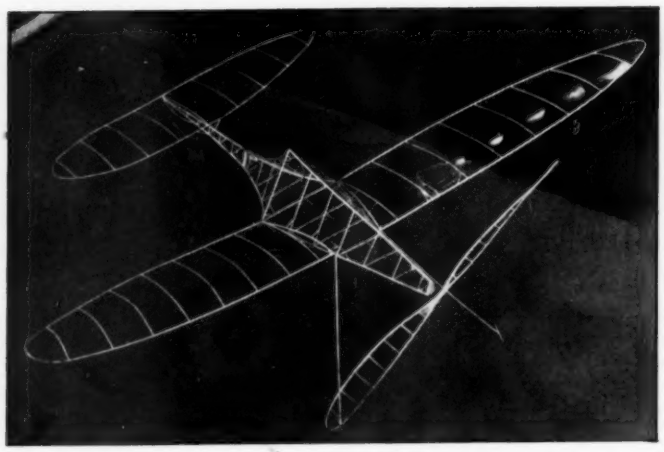
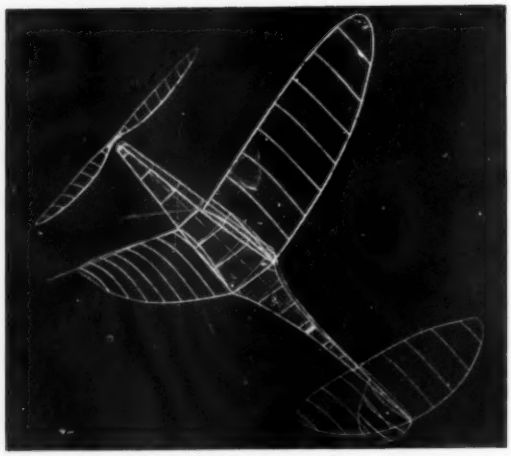




How this remarkable low-wing indoor fuselage model appears from above and below

By WILLIAM GOUGH, Jr.

A Low Wing Indoor Winner

Drawings by Felix Gutmann

The Story of an Indoor Fuselage Plane of Unusual Design That Has Won Several Contests—How You Can Build It

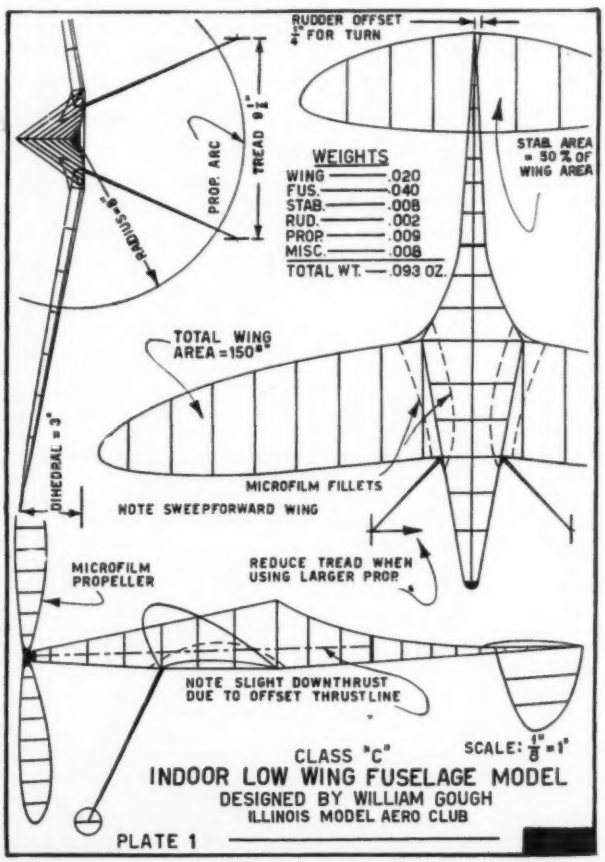
FOR the past several years the author has experimented extensively with indoor low-wing fuselage models and hopes in the future to prove that in time trials they are superior to the present trend of high-wing designed indoor fuselage ships of the class "C" type, (150 sq. in. wing area.)

Since the first indoor fuselage contest held many years ago, the high-wing type of indoor fuselage model has prevailed. Mainly because most model builders were content to follow the general trend in design which did not change. Through these years it was generally believed that no other type could compare with this very successful design. This was true since very few tried to design a better type.

So, gather 'round fellow model souls, for thou shalt hear of the tale of woe, that turned to a story of cheer. Up until about two summers ago this writer was completely a high-wing model airplane fiend. Suddenly it dawned on him that his high-wing ships were not at all gratifying at the last contest, with the results that then and there he started to concentrate on low-wing models. His success has been such that he has won several important contests with the low-wing design presented in this article.

The forerunner of this design was a ship of class "B" construction. This model won the 1935 Chicago Jr. Birdmen indoor meet under difficult conditions beating all high-wing ships and recently making 15 minutes and 43 seconds. Unofficially this is the world's record for models of 100 sq. in. wing area.

At the 1936 N.A.A. National model airplane meet held at Detroit, Michigan, a rumor floated about that there would be no serious competition in the indoor fuselage event. Keeping this in mind I set to work on the morning of the day of the contest to build a winning model. Unfortunately, the design did not prove to be the winning one for that day. However, having almost completed my ship late in the afternoon (with the exception of assembling) I rushed out to the Olympia Auditorium and to my dismay learned that there remained but one hour and a half for flying. Nevertheless, I did my best at the moment and within half an hour she was ready for flight.



After one trial flight and two officials averaging over ten minutes, and during the last minute rush for flights, this ship's last official netted almost 13 minutes upon attaching itself to the balcony overhead which prevented further timing. Had this flight been complete its duration would possibly have been near 17 minutes for this model had used but two-thirds of its maximum turns, which was 1800. This ship built hurriedly as you may have gathered placed 5th at its first N. A. A. National meet. And thus did a rumor prove to be untrue for as many will agree competition was keen.

It happened at the American Legion contest held in Indianapolis, Indiana, last August 1936 where a ruling was introduced which prevented the use of microfilm at this meet. Instead old man tissue was pressed into use again whereby Mr. Model Expert calmly tried his utmost to make a tissue-covered ship float about

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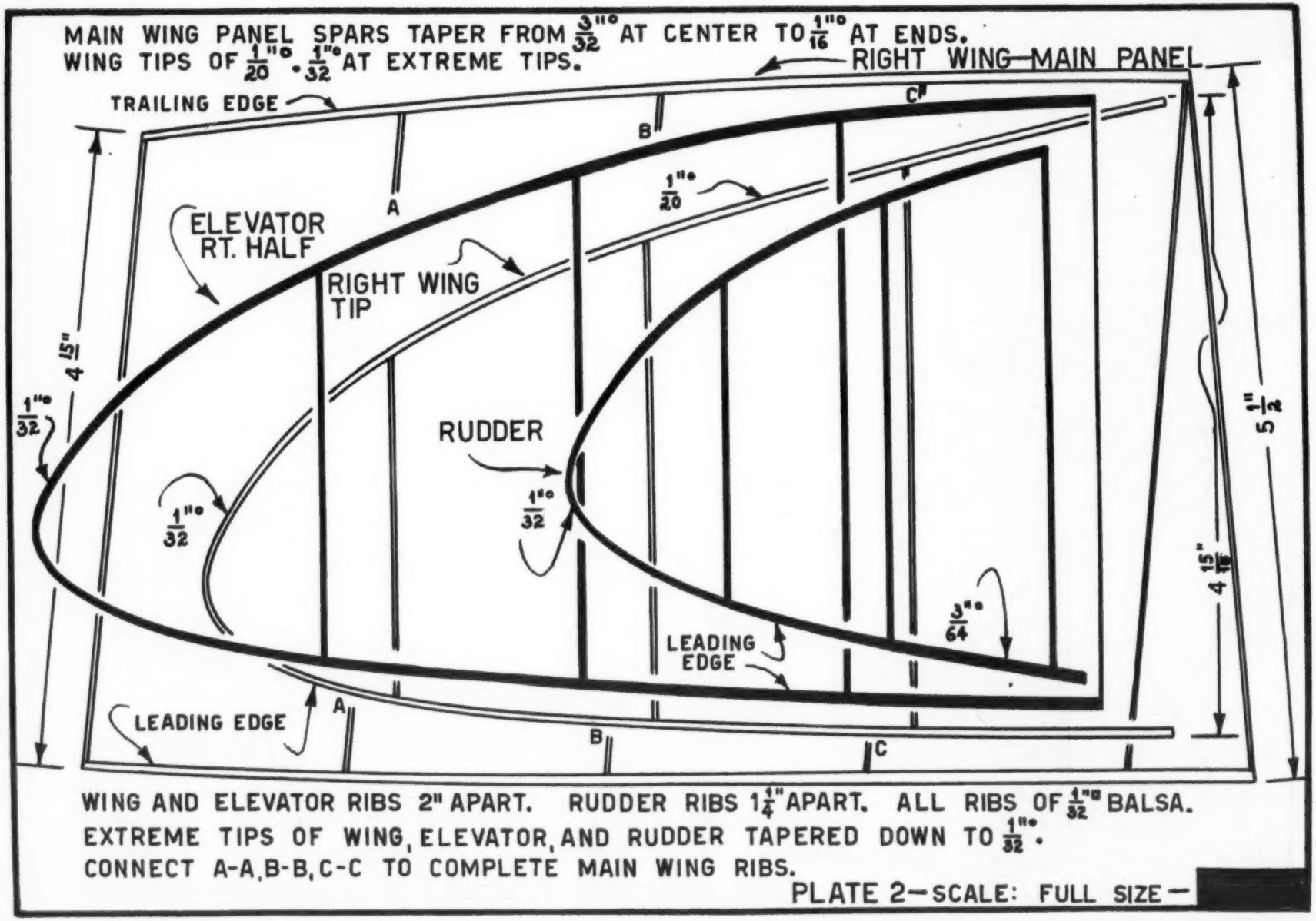
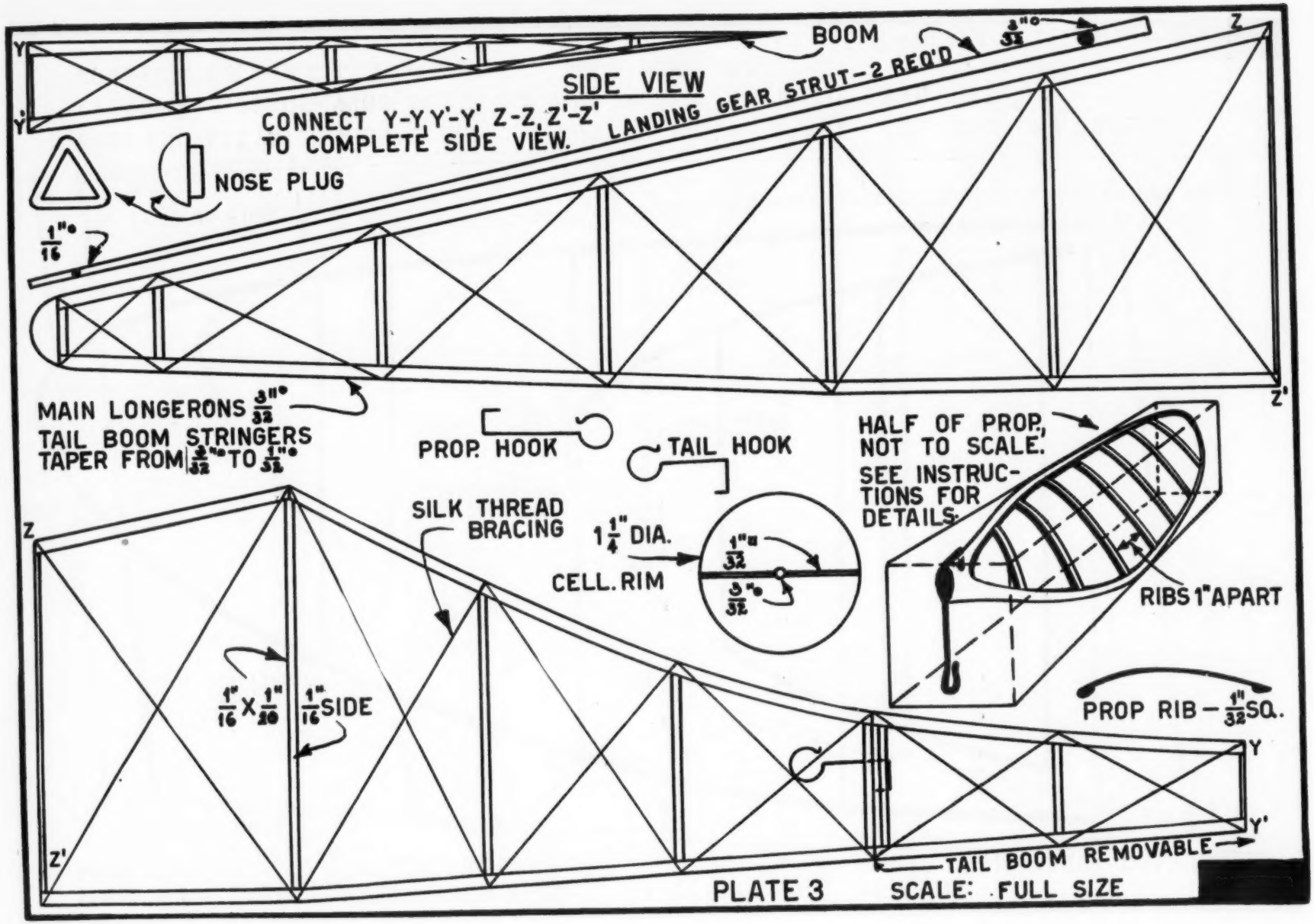
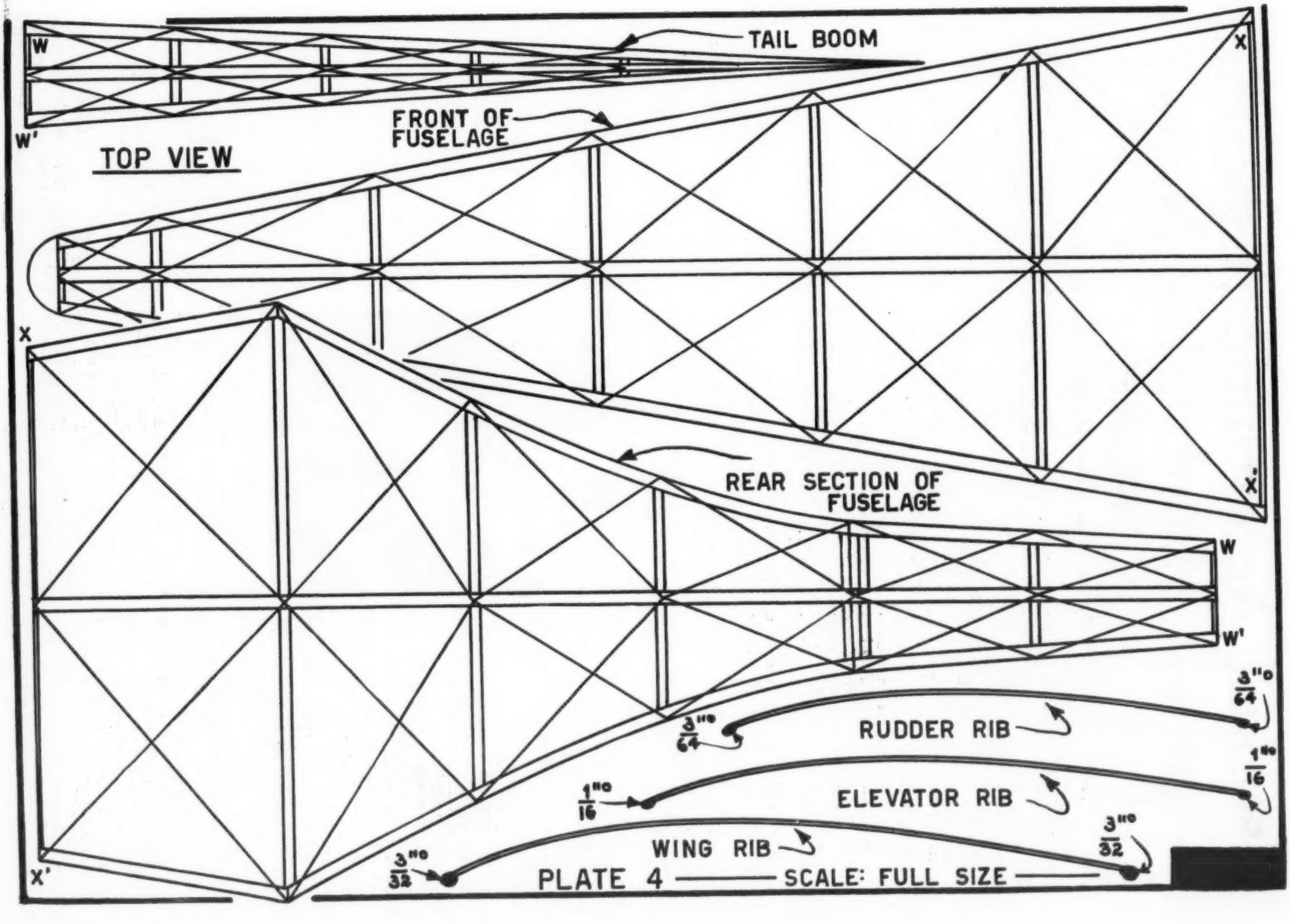


WING AND ELEVATOR RIBS 2" APART. RUDDER RIBS 1 1/4" APART. ALL RIBS OF 1/32" BALSA.
EXTREME TIPS OF WING, ELEVATOR, AND RUDDER TAPERED DOWN TO 1/32".
CONNECT A-A, B-B, C-C TO COMPLETE MAIN WING RIBS.

PLATE 2—SCALE: FULL SIZE—


SIDE VIEW
BOOM
3/32" O
Z
Y
Y'
CONNECT Y-Y', Y'-Y', Z-Z', Z'-Z'
TO COMPLETE SIDE VIEW.
LANDING GEAR STRUT - 2 REQ'D
NOSE PLUG
1/16" O
Z'
MAIN LONGERONS 3/32" O
TAIL BOOM STRINGERS
TAPER FROM 3/32" O TO 1/32" O
PROP. HOOK
TAIL HOOK
HALF OF PROP., NOT TO SCALE.
SEE INSTRUCTIONS FOR DETAILS.
SILK THREAD BRACING
1 1/4" DIA.
CELL. RIM
1/32"
3/32" O
RIBS 1" APART
1/16" X 1/20"
1/16" SIDE
PROP RIB - 1/32" SQ.
Y
Y'
Z'
TAIL BOOM REMOVABLE
PLATE 3
SCALE: FULL SIZE


TAIL BOOM
W
X
W'
FRONT OF FUSELAGE
TOP VIEW
X
X'
REAR SECTION OF FUSELAGE
W
W'
3"/64
RUDDER RIB
3"/64
1"/16
ELEVATOR RIB
1"/16
3"/32
WING RIB
3"/32
X'
PLATE 4 —— SCALE: FULL SIZE ——

National Aeronautic Association Junior Membership News

Prepared by National Aeronautic Association, Dupont Circle, Washington, D. C.

More and Better Model Contests? Yes Sir!

Ardent modelers from all over the Carolinas were at Charlotte to take part in the Southeastern Gas Model Contest held on September twenty-sixth.

Mrs. Patterson, N.A.A. Contest Director for Charlotte and vicinity, acted as director and reports the meet a great success.

First place in the Mechanical Timer event was won by Bill Johnson of Charlotte, who, according to reports, has been building models for five years. He won the silver cup for this event, and since he will not compete for it next year, he was given a medal which will stay in his possession. Second place was won by Alan Booton of Asheville, who received a Quaker Flash gas model kit for his prowess. In the limited fuel event the prize winners were Charlotte Model Airplane Club, first; Harvey Henderson, second; and Alan Booton, third.

The prizes were awarded at a luncheon meeting given by the Junior Chamber of Commerce, meet sponsor.

Though they encountered a little difficulty with their plans, everything turned out beautifully at the Indiana Gas Model Association Gas Model Meet at Indianapolis. A field was donated to this group. By some lucky chance, it was on the main highway leading to Chicago—result, the contest attracted much attention. Since the Association had decided to charge an admission of 25c a car, this location proved quite a financial boon, in fact so much so that they cleared $200.00. Profits would probably have been even higher had it been an invitation event. However, since the prizes were donated by local business men, it was understood that it would be a local event. The prizes consisted of four stop watches, five gas model kits, timers, air wheels, and many other useful things for the gas modeler.

Even though an infantile paralysis epidemic had prevented the public schools from opening and for this reason the number of contestants was materially reduced, two hundred modelers attended the Seventh Annual Greater Kansas City Model Airplane Meet which was held at Old Richards Airport. The crowd was estimated at between five and ten thousand, and that's no small congregation.

The contest was carefully laid out and beautifully run by E. L. Hughes, veteran N.A.A. Contest Director. The two sides of the field were roped off and patrolled by about 100 Boy Scouts. The weather conditions were not the best but out of the 200 entrants only 10 crack-ups were recorded. There was a wind velocity of from fifteen to twenty miles per hour during most of the afternoon, so that's a swell record.

Baylord Wetherill took first place in the Gas Model event with a time of 15 minutes and 44 seconds. In the contest for outdoor planes of the Jimmie Allen types, Floyd Field, Emporia, Kansas, a veteran in the model field, won first. However, this was not so unusual for Floyd, who has taken first place in the Jimmie Allen race at Wichita for four successive years. Melvin Solvay won first place in the fuselage model event. Eugene Nelson won first in the Junior stick, hand-launched event. Much credit to E. L. Hughes for the efficient manner in which this meet was conducted.

Ho Hum! New Records to Chicago and Boston

Because we did not get official word until too late to make the October issue, we

Contestant Harold Crawford at Kansas City contest, Edwin E. Price who supervised first Kansas City meet 10 years ago at Fairland Park and Albert Hinshaw

are happy now to announce that Edmund Whitten, at a Jordan Marsh-Junior Aviator Meet, broke the record for Seniors for both Class C and Class D cabin fuselage, R. O. W. models. His time for the Class C model was 11.9 seconds and for the Class D model 16.9 seconds. Nice going, there fella!

Again the Chicago Aeronautics have broken through. Two more Chicago record applications have been received at headquarters and are now new official national marks. The first was made by Milton Huguelet with a Class B indoor stick R. O. G. model in the Senior division. He tacked up the admirable time of 17 minutes 36.4 seconds. The second record was made by Joseph P. Matulis in the Open division with a Class A indoor stick model R. O. G. with the fine time of 11 minutes 33.8 seconds.

Both these records were established at one of the regular Record Trials events held within the Chicago Aeronuts Clubs. As a matter of interest to many, Joe Matulis has regained the record which he held for two years, but which was taken away from him two weeks before he set this new record, by Roy Wriston of Tulsa, Oklahoma.

Another record established in Chicago recently was one made by Alex Nekimken at a Record Trials event held on September twenty-ninth. This was for the Junior division with a Class B Fuselage R. O. W. indoor model. He made the excellent time of 5 minutes 6.6 seconds.

You have to hand it to these Chicagoans for turning in some of the finest performances of any group in the United States. It is astonishing to go down the record list and see how many record holders are living in Chicago.

At a meeting of the Senior and Junior Chapters of Aurora, Illinois, at the Leland Hotel, a beautiful $50 scale, gas-motored model was presented to Richard Thornton. This plane was for first place in the summer's Model Airplane competition. Mr. Ted Stoner, president of the Senior Chapter, did the honors.

And Watch Those N.A.A. Model Chapters Grow!

Louisiana can now boast of four chapters, all formed since the first of June. At that time we had one representative down there in the person of Rocco S. Glorioso. He knew that the state had possibilities and started out to make use of them in just the right way. With the assistance of the Senior N.A.A. and State officials, Rocco directed a statewide meet which drew many people from all over the state and gave model aviation a fine boost. As evidence of the interest aroused, we already have received two charter applications. One came from Jeanerette and the other from Rayne. With two Chapters besides those just mentioned, Louisiana is showing its colors to other states.

Along with these new chapters, two new Contest Directors have been appointed,

Bill Johnson, 17, who won the timer event in the Charlotte, N.C. contest with an average of 2 min. 11 sec. for three flights with his "Miss America" Brown-powered

Judges of the Charlotte, N.C., contest. L. to R., Bob Bryant, judge; Mrs. Clayton Patterson, contest director; Al Bechtold, Pres. Jr. Chamber of Commerce, and Bomar Lawrence, judge.

Tilden J. Robichaux, Jr. for the Jeanerette Chapter and Dudley Avery, of Lafayette, who says that another Chapter is on its way in that city.

The West coast has brought forth two new Chapters of late, one in Spokane, Washington and the other in San Diego, California. The Spokane Chapter will be under the direction of Cecil J. Pounder, a newly-appointed Contest Director. This Chapter should really do a fine job since they are to receive the assistance of the Chamber of Commerce. We're looking forward to some good work, Spokane, so watch your step.

The San Diego Chapter will be headed up by James M. Roche. He writes us that he plans, if things go well, to have a western states meet. That should sound good to the many builders in that vicinity. More power to you, San Diego Aeroneers, we're all for you.

The Philadelphia Gas Model Association, which, as many of you know, is a plenty active organization, has sent in application for, and now is, a Chapter of the N.A.A. We have been happy to sanction many meets for this group. It is now a real pleasure to welcome them as a Chapter of our Association.

For a long time now we have been telling you about a certain F. X. Downey of Wichita, Kansas. He is largely responsible for the fine work that has been done in recent months in the state of Kansas. And now he has done it again! We mean that he has helped to form another Junior Chapter in Kansas. This one is in El Dorado and will be under the direction of Murl V. Fry, who, judging from the fine send-offs he has received, will make an excellent Contest Director. There is real meat for state minded readers in his following comments on statewide organization!

"Out in Kansas, there has been formed a State Contest Board which is composed of N.A.A. Contest Directors, Senior Advisers of Junior Birdman Clubs and N.A.A. members who are interested in promoting Model Airplane activities.

"The necessity of such an organization is apparent. With the increasing popularity of this instructive sport of model building, the need of a governing body, empowered to regulate local, district, and state meets, in my opinion has become a necessity.

"At the suggestion of an official of one of the aircraft factories in Wichita a State Championship contest sanctioned by the N.A.A. was promoted. Naturally some confusion arose as to the status of the Topeka contest. It was then that Dr. Hugh D. Wilson, Contest Director of Topeka, and myself got together and from his idea we worked out the plan of a State Contest Board which would be empowered, with the approval of the Washington Office as follows:

1. To pass on all requests for dates and locations for sanctioned contests within the state.
2. To approve such request before the N.A.A. sanction would be granted.
3. Such board to pass on statewide records as the National Board does for the entire country.

"There is no question as to the increasing popularity of model flying among our youth, adults too for that matter, especially since the gasoline-powered model has become such a factor and encouragement should be stressed to the last degree. Again there arises the necessity of rigid supervision.

"It would seem therefore that each state should have its Contest Board as a logical solution to some of the problems which are confronting the National Board. Better cooperation naturally means a greater interest.

"Wherever possible I think each state should also have a director of Model Aeronautics. This has worked out well with us and those interested in Junior groups have been able to keep in close touch with the work being done in the different localities. A natural consequence of this supervision has built up a number of new Junior Chapters.

Fill in the coupon below for membership in the N.A.A.

Use this coupon for either junior membership application *or* for requesting NAA Junior Chapter information.

NATIONAL AERONAUTIC ASSOCIATION OF U.S.A.
Dupont Circle, Washington, D.C.

☐ Please send me information on how to form an NAA Junior Chapter and a Chapter charter application form. I enclose a 3c stamp for return postage.
☐ I enclose fifty cents for annual NAA Junior membership dues (use cash, check or money order) and hereby make application for Junior membership in the National Aeronautic Association. (Age limit 21 years).

Name .....
(Please print or type)

Street .....

City ..... State .....

Date of Birth .....
(Month, Day, Year)

Membership application approved* .....

*(If membership application is being made and applicant is under eighteen, have parent sign here.)

Winners of the Louisiana Statewide Meet. Left to right they are: W. Williams, Robert Basnett, L. Alford, A. W. Powell, Edward O'Donnell, Robert Duncan, Pratt Munson, Maurice Gelpi, Virgil Vidrine, Levy, Harry Jumonville, Edward Gossen, A. W. Powell, winner of Leche and Evangeline Gas Model Trophies, Rocco S. Glorioso, director of the contest

"It is remarkable what we have been able to accomplish in the past year. The Educational Boards in many of our cities have approved of our work and are landing much cooperation toward making Model Airplane Building a subject for Hobby Classes and the like. The Park Boards are recognizing the importance of making model building a part of their summer recreational classes. Both in Wichita and Topeka much of the success in handling the general arrangements must be attributed to the Park Board officials. Newspapers all over the state were very kind in giving our state Championship Meet fine publicity. All of this has been accomplished through organization.

"The successful climax to our plan was accomplished when we held a meeting on the evening of August the fifteenth, the date of the contest, when nearly every Contest Director and Senior Adviser in the State was present.

"Some valuable ideas were exchanged but for the most part the plan which had been discussed and agreed upon by groups in different localities was universally adopted.

"Dr. Wilson was made Chairman of the Board and D. F. Sump of Wichita is Secretary. With two such consistent gentlemen at the helm, I look forward to a bright future for next year."

Contests Coming

November 6.

Jordan Marsh-Boston Traveler bimonthly indoor contest to be held at the South Armory, Irvington Street, Back Bay, Boston, under the direction of Albert L. Lewis, Gunnar Munnick and Willis C. Brown.

November 13.

The Philadelphia Gas Model Association will hold a gas model meet at the Northeast Philadelphia Airport under the direction of William S. Berry.

November 13.

The Aero Club of Washington and the Department of Playgrounds will sponsor an outdoor and indoor meet, the former to be held at Fort Myer Drill Field and the latter at the Constitution Hall under the direction of John H. Williams.

November 20.

Jordan Marsh-Boston Traveler bimonthly indoor contest to be held at the South Armory, Irvington Street, Back Bay, Boston, under the direction of Albert L. Lewis, Gunnar Munnick, and Willis C. Brown.

December 4.

Jordan Marsh-Boston Traveler bimonthly indoor contest to be held at South Armory, Irvington Street, Back Bay, Boston, under the direction of Albert L. Lewis, Gunnar Munnick and Willis C. Brown.

December 11.

The Philadelphia Gas Model Association will hold a gas model meet at the Northeast Philadelphia Airport under the direction of William S. Berry.

December 18.

Jordan Marsh-Boston Traveler bimonthly indoor contest to be held at the South Armory, Irvington Street, Back Bay, Boston, under the direction of Albert L. Lewis, Gunnar Munnick, and Willis C. Brown.

National Meet Questionnaire Tells All

Tabulation of the questionnaires distributed to participants in the recent National Meet at Detroit discloses the following:

The preferred time for the 1938 National Meet is the first part of July. Opinion was 3 to 1 against holding the Meet in the latter part of August. The preferred length of the National Meet is four days. The majority of the questionnaires were against separate nationals for indoor, outdoor, and gas events. Major contest recommendation for 1938 was more timers.

The majority had no rule changes to recommend. A scant majority preferred power shut-off to fuel allowance. Preferred power shut-off time was 30 seconds. Preferred gas allowance 1/16 ounce.

Of the questionnaires distributed, 71 were filled out and returned. The following gives the actual counts per question:

Q. Would you prefer early summer, mid-summer, or early fall for the 1938 National Meet?

A. 39 prefer mid-summer, 19 prefer early summer and 16 prefer early fall.

Q. What exact dates do you recommend for the 1938 National Model Meet?

A. 31 recommend the first part of July, 9 recommend the last part of July, 13 for the first part of August, 8 for the last part of August, 4 for the first part of September and 5 for the last part of June.

Q. How would you feel about dates in the latter part of August?

A. 55 were against the latter part of August and 20 were for it.

Q. How many days do you think the meet should run?

A. 27 felt that the meet should run 4 days; 23 felt it should run 3 days; 22 felt that it should be for 5 days; 6 felt that it should be for 6 days.

Q. Would you favor holding a separate National Indoor Meet?
Would you favor holding a separate Gas Model Meet?

A. 60 preferred not holding a separate National Indoor Meet and 11 wanted to hold it separately.

56 preferred not to hold a separate Gas Model Meet and 15 wanted to hold it separately.

Q. What additional do you feel should be done in the way of entertainment at the National Model Meet?

A. 27 suggested more free movies, larger lunches, etc., and 5 asked for more meetings and discussions.

Q. What criticisms do you have on the contest handling of the several events?

A. 48 voted for more timers, 10 asked for earlier preparation for the Nationals, and 2 voted for fewer events.

Q. What suggestions do you have on contest handling and arrangements for next year?

A. 48 voted for more timers, 10 asked for earlier preparation for the Nationals, and 2 voted for fewer events.

Q. Do you object to Detroit as a location for the National Meet?

A. 27 of the 71 who sent in questionnaires were against Detroit.

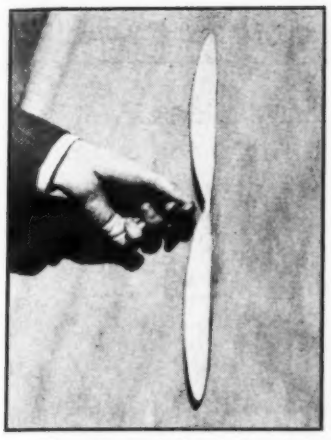
Q. What city would you recommend?

A. 37 suggested Akron, 19 suggested Detroit, 13 suggested St. Louis and 10, Chicago.

Q. Do you have any changes to recommend in the National Rules governing contests and records?

A. 53 asked no changes in the rules. Other suggestions were: Heavier outdoor loadings, gas allowance according to engine displacement, simplify record lists, keep gas-powered out of rubber-powered contests, one ounce to each 25 square inches throughout, change Moffett back to American rules, increase in weight rule, minimum weight rule for gas models, reduction of gas allowance, lower Moffett

(Continued on page 52)



Two views of the efficient indoor propeller described in this article

Secrets of Successful Indoor "Prop" Operation

Facts Gleaned From the Experience of an Expert That Will Make Your Indoor Propellers More Efficient

By CARL GOLDBERG

ALONG towards the middle of the summer of 1933, a slim, undistinguished looking 16" propeller was carved for use on a 40" span indoor tractor model. That prop was due to write plenty of model airplane history, but you never would have guessed it to look at it. For the next three years running, 1934, 1935 and 1936, it won the National Indoor Contest. Its average winning margin was two minutes and thirty-six seconds. Altogether, in competition and out (but mostly in) it has made thirteen flights of twenty minutes or more.

Consistency seems to be one of the most difficult features to get in a model airplane, so the author decided to study this prop to find out what makes it "bring home the milk" so regularly. The facts that were discovered and the history of development behind it all, are being presented here for the benefit of us who feel that the propeller is the most baffling part of copying a record model. At this writing, it still holds the national open record of 23 minutes, 29.3 seconds, established under trying conditions below the 135 foot high roof of the St. Louis arena in 1935.

Naturally, this propeller was the result of years of previous experience with indoor models, particularly of the tractor type. Among the many things which had been learned were the following: the weight of a prop could be kept low by using a fairly high camber to help furnish the necessary strength. The best balsa to use weighed from 4.5 to 5 pounds per cubic foot. Also, quarter-graining was an important strength factor. The finest possible finish had to be employed to cut down the drag; and consequently you find every expert who uses wooden props today spending several hours finishing with 10-0 sandpaper. It is a good idea to spend the last half hour rubbing with the *back* of the sandpaper sheet, as this packs the surface of the wood, producing still less drag.

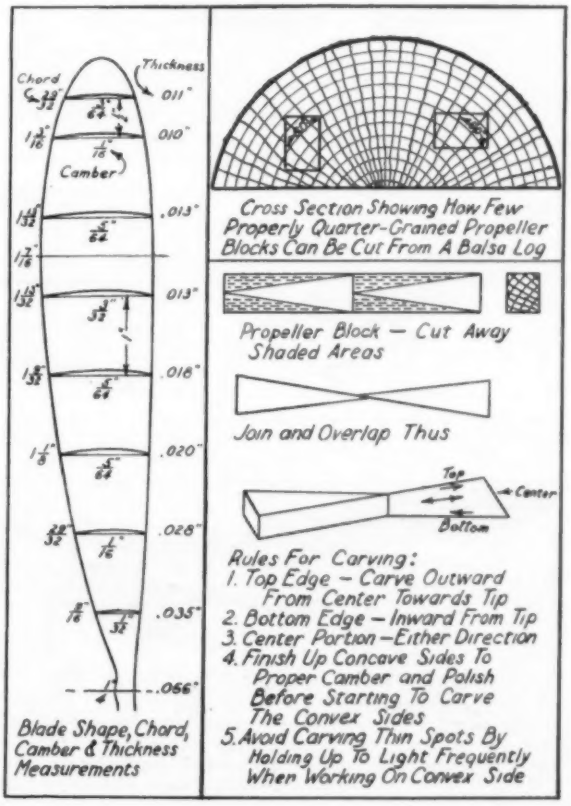
The shape of the prop is another very important consideration. Many shapes were experimented with, and they all seemed to prove that the best is one which resembles the outline of a fairly thick wing section such as the Clark Y. It seems that such a shape has the area distributed properly, and is able to produce a large amount of thrust for a small amount of drag.

Experience had also indicated that the best pitch for an indoor prop is about two times the diameter. For example, if a prop is 16" in diameter, its pitch should be about 32". We found that if the pitch were much less than this, the model would have a tremendous climb, but would usually come down with winds still remaining in the motor. This indicated that low pitch is very efficient for climbing, but rather inefficient for the *combined* work of climbing, cruising and coming down. In 1935, an article was published in which it was argued that the best pitch is about 1.3 to 1.5 times the diameter; that is, a 16" prop should have a pitch of 21" to 24". The author happens to know one fact that was not stated: the tests on which this claim was based were climbing tests. No wonder they showed the pitch should be so low! These tests may be all right for outdoor models, where the prop is expected to do nothing but climb the ship; indoors, however, is another matter. Furthermore, the propellers used in these tests were not of the indoor variety either in size or camber.

To get back to the subject, it was discovered that in the summertime rubber motors reached their maximum efficiency and climbed indoor models too high for the available buildings. "Cutback" in the leading edge, right near the hub, was developed to hold down the climb, and at the same time to reduce the great strain of the start of the flight, when the motor delivers its highest torque.

All of these various factors were taken into account in the design of the propeller we are studying. The results immediately were gratifying. One of the test flights stands out as a good example. The model was wound up and launched, and after it had been up several minutes, we all started guessing (from the way it was flying) how much time it would make. The average guess was around twelve minutes, the maximum fourteen minutes. But it fooled us badly and made nearly seventeen before it finally touched the floor.

(Continued on page 48)



"Gas Lines"

What Gas Model Builders in All Parts of the World Are Doing to Increase the Knowledge of Aviation

The I.G.M.A.A. Pin

Pict. No. 1. Paul Zakim gets his ship into flight at the I.G.M.A.A. Kresge contest at Hadley Field, Oct. 16

I.G.M.A.A. NEWS

AT THE time of writing, momentous things are happening concerning the I.G.M.A.A. Complete details concerning what is happening cannot be divulged in this issue. However we can promise you that something which is most beneficial to every I.G.M.A.A. member will be reported soon. It is sufficient to say that an important conference is to be held in Washington which will have bearing on the activities of gas models throughout the entire United States.

We wish to call attention to the fact that Maxwell Bassett still holds the I.G.M.A.A. trophy with a flight time of 23 minutes, 18 seconds. Fuel allowance for this flight is ⅛ ounce of gas per pound of weight of airplane. We wonder who will be the one to take the trophy away from Maxwell.

In order to be eligible for this trophy a flight must be made with a gas model in excess of this time. The boy must inform headquarters of the I.G.M.A.A., 551 Fifth Avenue, New York City, of how the flight was made and have it verified by at least two witnesses who must be I.G.M.A.A. officials. We suggest that all units and individual members send us each month records of their outstanding flights so that they may be published in "Gas Lines." By doing this all members will be informed as to what other fellows are doing.

On October 16th, I.G.M.A.A. Unit No. 2 of Newark, N.J., held a large contest at Hadley Field, New Jersey. This unit is directed by Mr. Ben Shereshaw under the sponsorship of the Kresge Department Store at Newark. Mr. Shereshaw directed the contest, which had about 150 contestants who put on an excellent show.

Picture No. 1 shows a thrilling moment in the life of Paul Zakim, which took place at the contest. He is shown taking off his "Zeus" for a ten minute flight. Paul has had great hopes for this new ship, which he recently designed. However, misfortune seems to have been trailing him. One thing after another has happened to him at the several contests in which the ship was entered. In this meet the ship took off, flew for a length of time and cut off. It was discovered too late that worn batteries caused the difficulty.

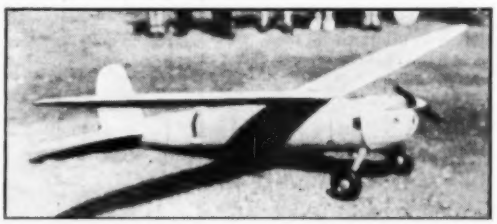
Is it not time that experienced gas model builders proceed to check up on their planes in a more systematic manner? Of course if they do not, no one is hurt but themselves.

Here we have a very unusual job for you. It is shown in picture No. 2. This is a brain storm of Fred

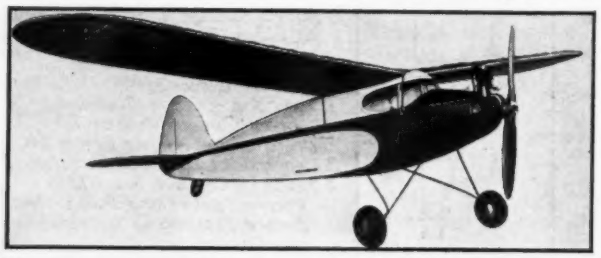
Pict. No. 2. Fred Kunzmann and his "What do you call it," the queerest gas job ever produced. It is a flying bullet with a 20" wing span

Pict. No. 3. A unique "pusher" which its builder, A. Barters of Australia calls the "Flying Pig"

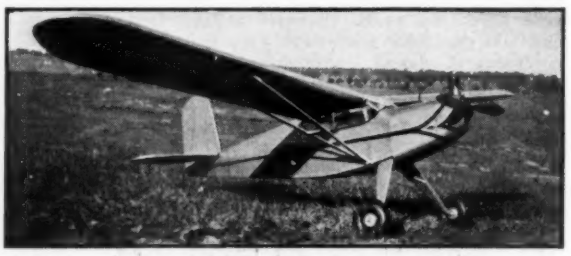
Pict. No. 12. A scale model of Art Chester's racer built by W. G. Carroll



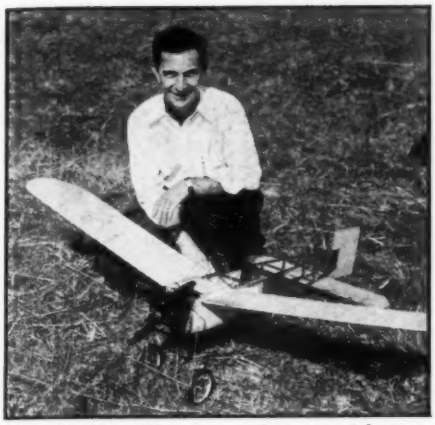
Pict. No. 14. A model of Leo Weiss' 1936 "Nationals" winner, built by Edmund Rosenbergh. This job has a cantilever landing gear with internal shock absorbers



Pict. No. 6. Irwin Ohlsson's gas job that won 1st place at the Cal. State Fair Contest with the greatest number of points for flight and engineering



Pict. No. 7. F. H. Cooper's model which won the eighth annual flying exhibition at Sydney, Australia, with 80 points out of a possible 90



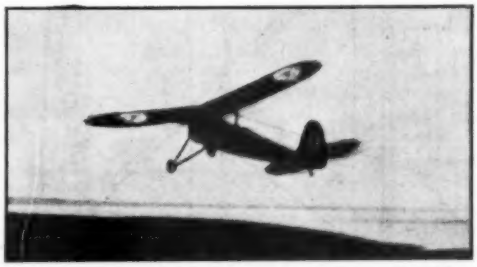
Pict. No. 10. The most unique gas job ever flown. A model of Bleriot's "Cross Channel" plane, by Perry Snare

Pict. No. 11. Raymond Levy adjusting his gas model just before the flight of 19 min. which established a new gas model record in France. It landed 18 miles from the starting point

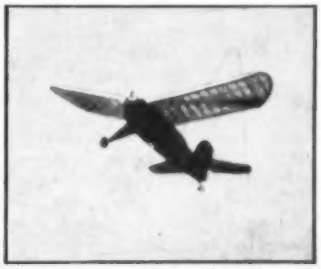
Kunzmann of 59 Sherman Avenue, New Brighton, S.I., New York, who is also shown in the picture. This little job has a wing span of only twenty inches, and was designed for high speed. In fact it appears to have such a high speed that Kunzmann is afraid to fly it and give it a thorough test. He had put many hours into it and it is finished in a very beautiful manner.

The versatility of gas model builders is beginning to show itself, for here we have another plane of unorthodox design. It is shown in picture No. 3 and was constructed by A. Barter, a member of the Model Aeroplane Association of Australia, 25 Stuart Road, Prospect, Australia. We are indebted to Mr. C. Georgeson of 84 Irish Thorp Road, honorable secretary of this club, for the "shot." The builder calls his ship the "Flying Pig." As you can see, it is along the lines of the modern so-called foolproof airplanes. The engine is mounted in the rear and the cell drives the pusher propeller.

Mr. Georgeson writes that they have had a very active unit of the I.G.M.A.A. for over twelve months. It is under his direction and there are thirty members. About fifty gas models have been built, twenty-eight have been registered. The club has adopted the I.G.M.A.A. pin as its badge and has had it attached to their blazer pockets. When it holds its meets the club flies under I.G.M.A.A. rules. We wish them the best of luck. If American boys don't look out the I.G.M.A.A. trophy may take a ride to Australia.

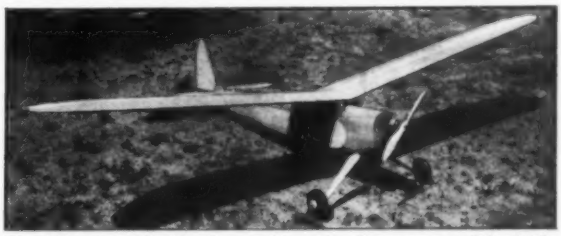


Pict. No. 4. Frank Martin's New Zealand record holder, takes the air for a flight of 8 min., 18 sec.



Pict. No. 5. A beautiful take off shot of E. Harris' 5½ ft. gas model

Mr. William B. Mackley of 8 Ascot Avenue, Remuera S.E. 2, Auckland, New Zealand, club captain of the Auckland Model Aero Club, tells us something of the Texaco contest they recently held. It was won by Frank Martin with a flight of 8 minutes, 18 seconds, using ⅞ ounce of fuel per pound of weight.



Pict. No. 13. John Pond's cantilever landing gear model which won 3rd place at a recent contest held by Unit No. 244

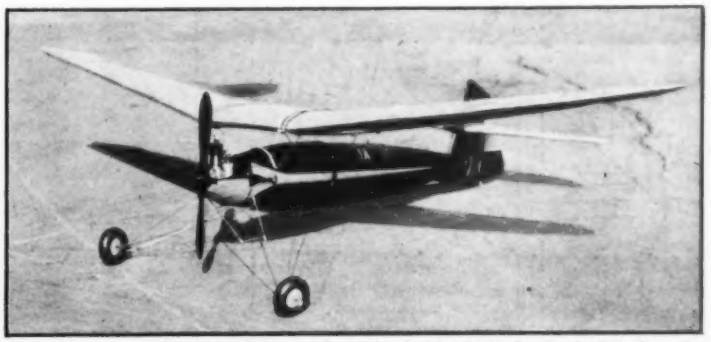
Picture No. 4 shows his model taking off for the winning flight. Mr. Mackley says:

"The Individual Entry event was won by F. C. MacDonald, president of the club. He flew his neat little TD Coupe for a time of 9 minutes, 31⅘ seconds. The model climbed beautifully, the motor cutting when it had about 500 feet altitude. The glide was perfect, but the model landed in the Manakau Harbor and was not recovered for about an hour. The motor was dried out and the model was flown again later in the day. How is that for consistency?"

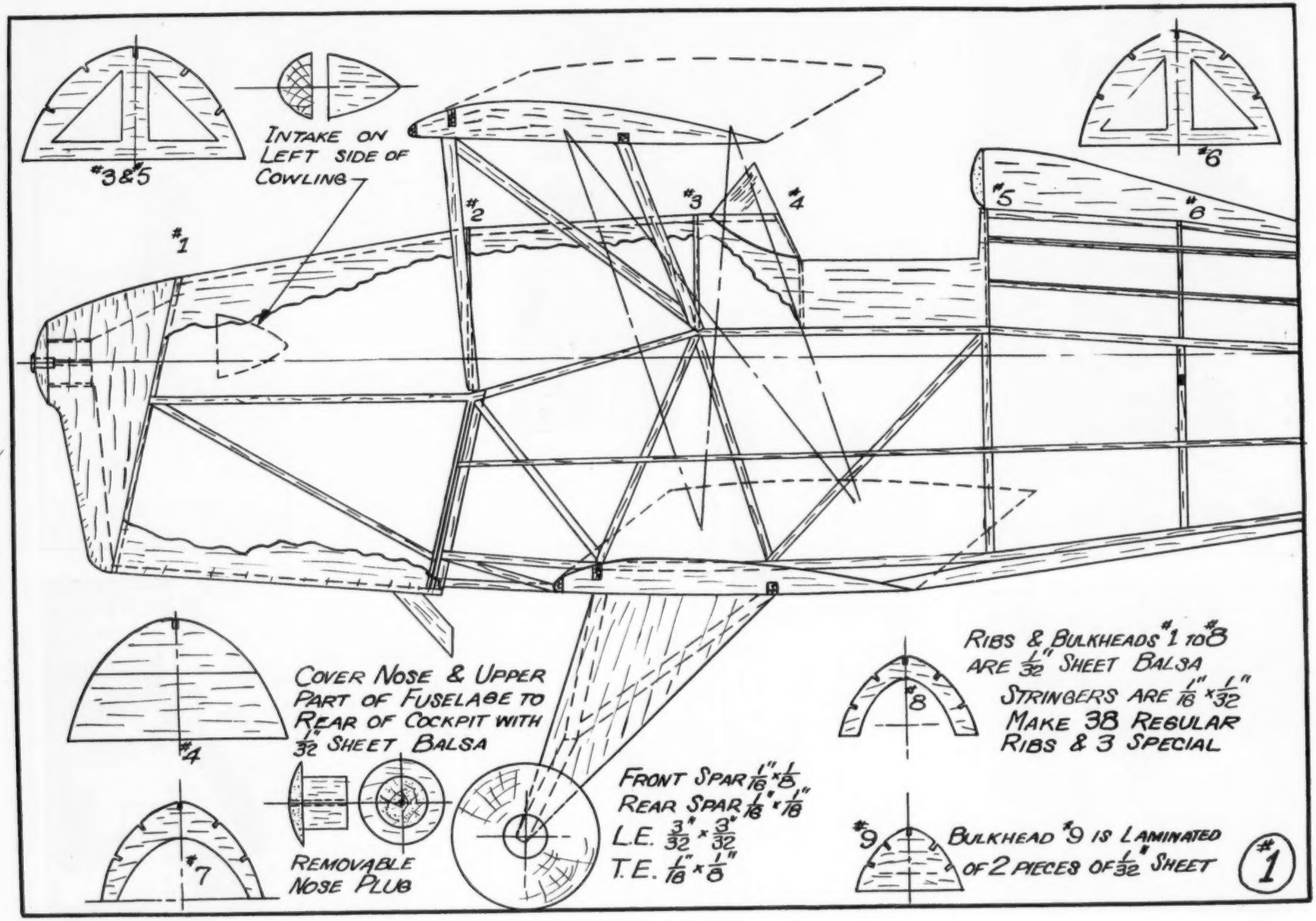
Mr. Mackley further remarks that he does not wish readers to feel New Zea-

(Continued on page 56)

Pict. No. 9. Bill Dunlevy with his 6 ft. Taylor Cub at the N.A.A. contest, Decatur, Ill.



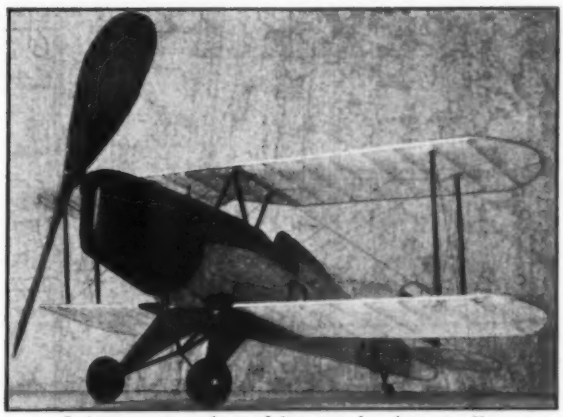
Pict. No. 8. A plane of efficient and stable design, built by L. S. Wigdor. It has a seven ft. span and weighs only 3½ pounds. The engine is four years old


#3&5
INTAKE ON LEFT SIDE OF COWLING
#1
#2
#3
#4
#5
#6
#6
#4
COVER NOSE & UPPER PART OF FUSELAGE TO REAR OF COCKPIT WITH 1/32 SHEET BALSA
#7
REMOVABLE NOSE PLUG
FRONT SPAR 1/16" x 1/8"
REAR SPAR 1/16" x 1/16"
L.E. 3/32" x 3/32"
T.E. 1/16" x 1/8"
#8
RIBS & BULKHEADS #1 TO #8 ARE 1/32" SHEET BALSA
STRINGERS ARE 1/16" x 1/32"
MAKE 38 REGULAR RIBS & 3 SPECIAL
#9
BULKHEAD #9 IS LAMINATED OF 2 PIECES OF 1/32" SHEET
#1

Build and Fly the Bucker Jungmeister

How You Can Build a Flying Exact Scale Model of One of the Most Famous Stunt Planes in the World

By A. J. McRAE, Jr.



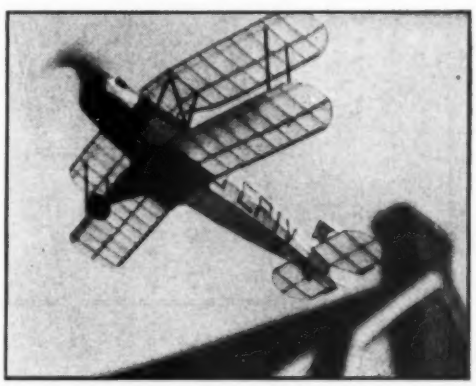
It is an exact scale model except for the propeller

THE Bucker Jungmeister is a high performance German advanced training biplane. One of these ships has been flown at the past two National Air Races by the Roumanian pilot, Alexander Papana, who has repeatedly shown its high maneuverability by flying across the airport upside down at altitudes of from ten to fifteen feet above the ground. Papana uses this ship for all high precision aerobatics for which he is well known. The Jungmeister lends itself very well for a flying scale model as it is well proportioned besides being of pleasing appearance.

The model described here is an exact flying scale model; that is, all the dimensions except the flying propeller are to scale. It is very unusual to find a model with a fuselage of this size that is not handicapped by an excessive wing span, small tail surfaces or a short landing gear.

Fuselage

Medium balsa is used throughout except where otherwise noted. The main framework of the fuselage is constructed of 1/16" square balsa. Plates No. 1 and No. 3 should be cut out and joined so that the sides of the fuselage may be built over them. After the sides are completed, plates No. 2 and No. 4 should be joined so that the upper and lower cross pieces may be put in place. Note that toward the front the lower cross pieces do not lie directly under the upper ones. At stations No. 6, No. 7 and No. 8, the upper cross pieces are not placed between the longerons, but are lowered about ¼" to allow the rubber motor to pass through. Next cut the bulkheads from 1/32" sheet balsa but do not notch them until they have been cemented in place. Bulkhead No. 9 is made of two pieces of 1/32" sheet balsa cemented together with their grain at right angles. The rear hook is attached to this bulkhead after which the hollowed out tail block is added. The stringers are 1/32" x 1/16" balsa.



An unusual and realistic action shot of the model in full flight

The entire cowling and the upper part of the fuselage up to the rear of the cockpit is covered with 1/32" sheet balsa. This can be done easily by covering in sections between bulkheads being sure to get good joints. The sheet balsa should be well sanded; a coat of banana oil well rubbed in will aid in bending the wood. When the cowling is finished the nose block should be cut roughly to shape and cemented to bulkhead No. 1. It can then be finished to the exact shape shown in the drawings. The nose block may be left solid but be sure to drill the 3/16" hole for the nose plug. The nose plug, details of which are shown in plate No. 1, should be made of hard wood if possible.

Just like the full size plane in appearance; it provides a real thrill when in flight

There is a single stringer on each side of the fuselage and one along the center of the bottom. These stringers are made of 1/16" sheet balsa tapered at the rear as shown in the top and side views.

The fuselage should next be covered except for the area over the center section on the bottom and a small area underneath the rear hook. Make the streamlined headrest of soft balsa hollowed out.

Wings

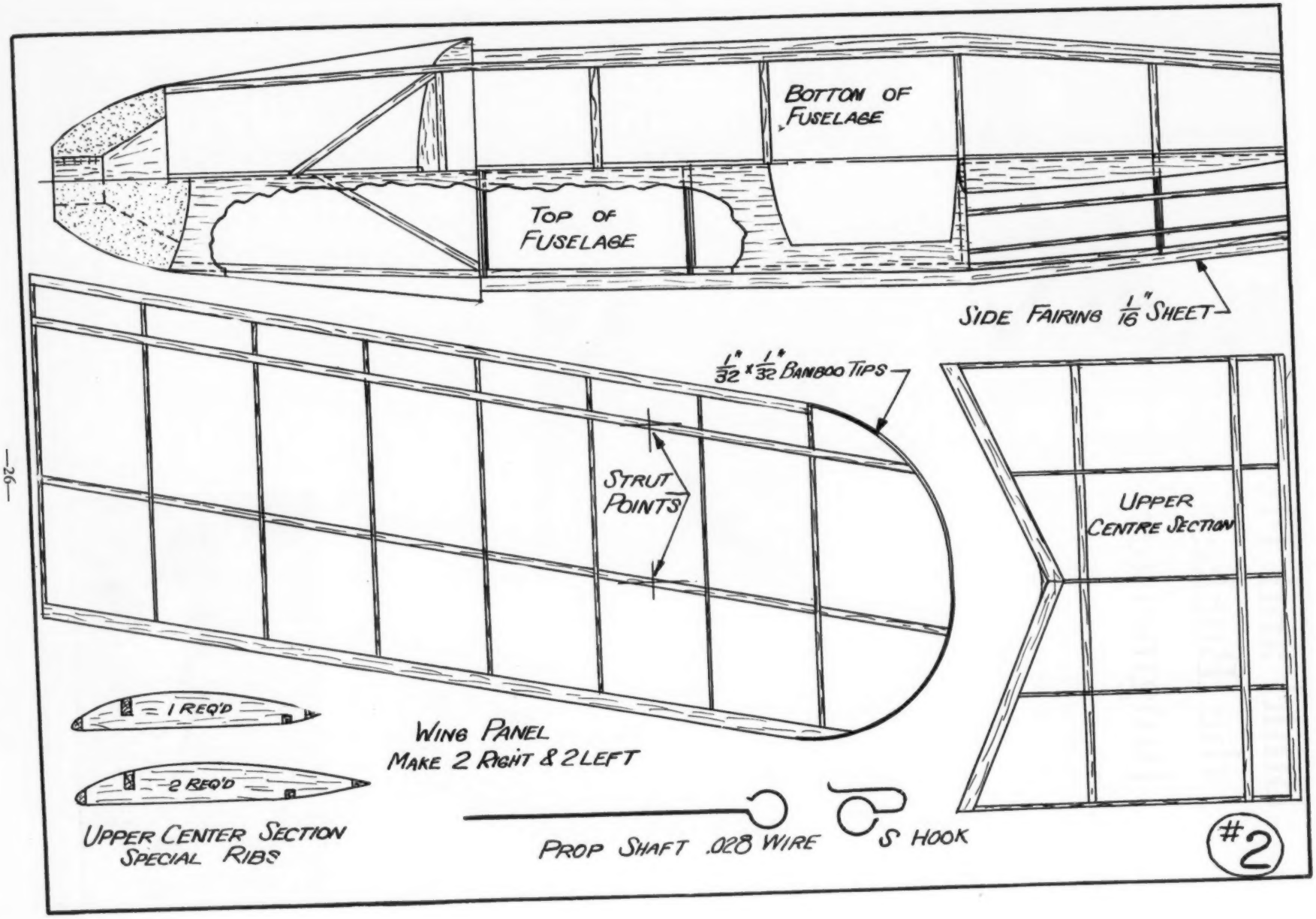
The wings are built in six sections; four outer panels and two center sections. They are of conventional construction. Thirty-eight regular ribs and three special ribs are required. The ribs are all cut from 1/32" sheet balsa. The lower center section takes the landing loads and is therefore covered with 1/32" sheet balsa except for the upper middle part into which the fuselage fits. The wings have an angle of incidence of two degrees. The upper and lower wing panels on each side are identical. When notching the ribs for the spars be sure to pin the ribs together so that you will have perfectly straight spars. The tips are of 1/32" square bamboo. All struts are of ⅛" x 1/16" balsa carefully streamlined.

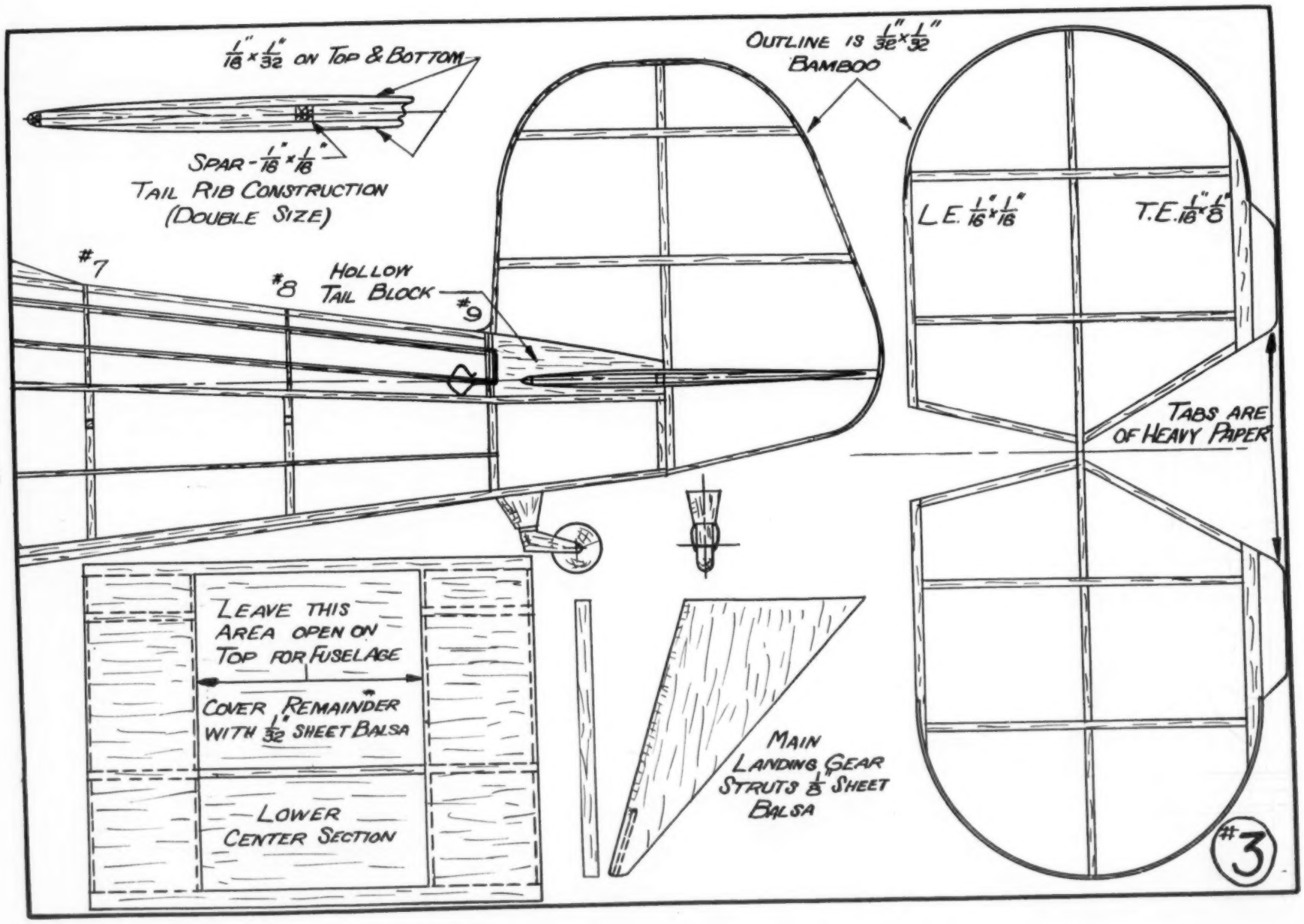
The wing fillets are made of very soft balsa cut to fit over the top of the lower center section. They are placed snugly up against the side of the fuselage but cemented only to the center section. Finish them off smooth with fine sandpaper.

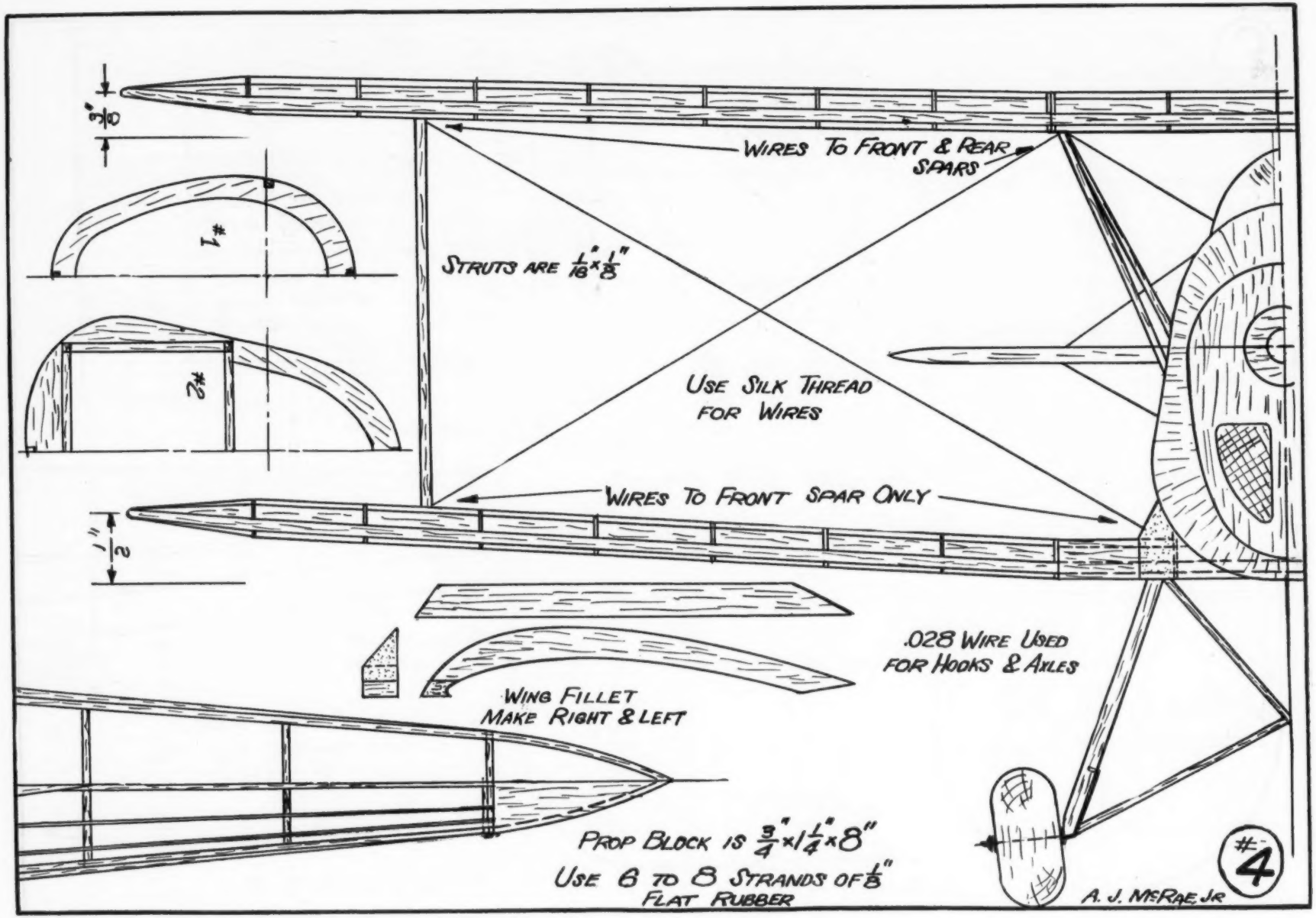
Cement small blocks of wood on the top or bottom of the spars where necessary at the strut points. The wires are of silk thread and consist of two landing wires, two flying wires and two diagonals between the outer struts on each side.

The landing gear consists of two main struts and five smaller struts of ⅛" x 1/16" hard balsa. The main struts are cut from ⅛" sheet balsa and are attached to the lower center section just outside the center ribs. The landing force is thus spread out over a very large area and no other shock absorbers are needed. Axles of .028" wire are attached to the lower part of the main struts and the smaller struts are added; 1-3/16" balsa wheels are used.

(Continued on page 40)


BOTTON OF FUSELAGE
TOP OF FUSELAGE
SIDE FAIRING 1/16" SHEET
1/32" x 1/32" BAMBOO TIPS
STRUT POINTS
UPPER CENTRE SECTION
1 REQ'D
2 REQ'D
WING PANEL
MAKE 2 RIGHT & 2 LEFT
UPPER CENTER SECTION
SPECIAL RIBS
PROP SHAFT .028 WIRE
S HOOK
#2


1/16 x 1/32 ON TOP & BOTTOM
SPAR - 1/16 x 1/16
TAIL RIB CONSTRUCTION
(DOUBLE SIZE)
OUTLINE IS 1/32 x 1/32
BAMBOO
L.E. 1/16 x 1/16
T.E. 1/16 x 1/8
#7
#8
HOLLOW
TAIL BLOCK
#9
TABS ARE
OF HEAVY PAPER
LEAVE THIS
AREA OPEN ON
TOP FOR FUSELAGE
COVER REMAINDER
WITH 1/32 SHEET BALSA
LOWER
CENTER SECTION
MAIN
LANDING GEAR
STRUTS 1/8 SHEET
BALSA
#3


3/8"
#1
#2
1/2"
WIRES TO FRONT & REAR SPARS
STRUTS ARE 1/16" x 1/8"
USE SILK THREAD FOR WIRES
WIRES TO FRONT SPAR ONLY
.028 WIRE USED FOR HOOKS & AXLES
WING FILLET
MAKE RIGHT & LEFT
PROP BLOCK IS 3/4" x 1 1/4" x 8"
USE 6 TO 8 STRANDS OF 1/8" FLAT RUBBER
#4
A. J. McRAE JR

AIR WAYS

HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Tell Others What You Are Doing

Air Ways Club News

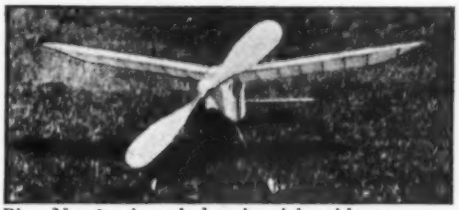
A clever drawing of the Bristol Blenheim Bomber by Norman Barker. It is a three to four place ship with a 275 m.p.h. speed

WE HOPE the Air Ways Club members have not overlooked the fact that the Air Ways Club trophy is awarded to the member who makes the greatest duration with any rubber-powered model. At present this trophy is held by Mr. James Cahill of 1419 North Gale Street, Indianapolis, Indiana, who flew his model at the Nationals for thirty minutes. This, at present, is the official Air Ways Club record.

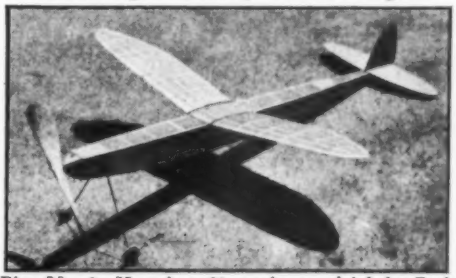
The winning ship may be in any category or of any size. We have heard rumors that in several localities Air Ways Club members have made long flights, some of them greater than Cahill's. This would make them eligible for the trophy, provided they send in complete data concerning their flight and proof thereof, including witnesses' signatures.

The trophy will not be awarded to any one who does not make application for it, based on a flight which he has made. Another requirement for the award of the trophy to any one is that he must submit the plans of the winning ship to MODEL AIRPLANE NEWS for publication.

The Air Ways Club has been growing slowly but surely. At present there are about 1200 active members. There are members in every state as well as in a number of foreign countries, Canada, and U.S. possessions. The club boasts of fifty members in Canada alone. Some of the foreign members in England are: J. F. Hodgson, 175 George Lane, Lewisham, London S.E. 13; Arthur Goldsbrough, 70 Colwyn Avenue, Derby; Ian Moore, "Grey Roof," Station Road, Mickleove, Nr. Derby; K. L. Walshaw, 32 Southfield Road, Bradford, Yorkshire; H. F. Worsnop, Greenwell House Farm, Blaydon-on-Tyne, South Durham; Jack Graham, 162 Manchester Road, Mossley, Nr. Manchester, Lancashire; Bernard Mathews, Hilbre Hodge Lane, Hartford, Cheshire. In Australia we have: Reg. Thorpe, 35 Liberty St., Belmore, Sydney; Douglas Abbott, 14 Howett Street, Glen Iris S.E. 6, Victoria; Douglas F. Boulton, 38 Iris Road, Glen Iris S.E. 6, Victoria; H. Cooper, Rae Street, Roma, Queensland; Roger Tennant, "Elphine Cottage," Wentworth Street, Launcashire, Tasmania; Fred Steven, 243 St. John Street, Launceston, Tasmania; Trevor Morris, 21 Donnelly Road, Naremburn, Sydney; Harry Lovington, 52 Victoria Street, Lidcombe, New South Wales; Allan Clement, Lloyd Street, Alderley, N.W. 2, Brisbane. In South Africa there are: Ben Sloan, 30-5 Avenue, Mayfair, Johannesburg; A. Posener, "Villa Eva," Off Kemms Road, Wynberg; Vivian Classon Gracie, "Xenia," Southfield Road, Plumstead, Cape Town; I. L. Posener, "Villa Eva," Off Kemms Road, Wynberg; Peter M. Moir, 31 Church Road, Walmer, Pt. Elizabeth; Henry DuPlessio, 8 Tulbagh Street, Worcester, Cape Province. Members in New Zealand are: G. F. Hanles, Junction Road, Hornby, Christchurch W.2; Eric Richard Hill, 109 Averal Road, Invercargill; N. J. Schellack, 1 Karetu Road, Epsom, Auckland. In Japan are: Harry Yamaguchi, % Miss Hirose, Imazu Machi, Numa Kuma Gun, Hiroshima Ken; Donald Moran, Dhukugawa, Nishinomiya. Other members in various sections are: Jose Meuiz de Medeiros Jr., Travessa Sallete 3, Sao Paulo, Brazil, South America; Albert Law, 123 Henry Street, Port of Spain, Trinidad, British West Indies; Charles Alexander, 18 Hil-

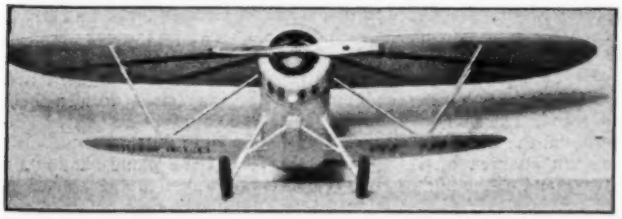


Pict. No. 3. A real duration job with an aspect ratio of only six. It flew out of sight after a 12½ minute flight. Built by Lawrence Nagle



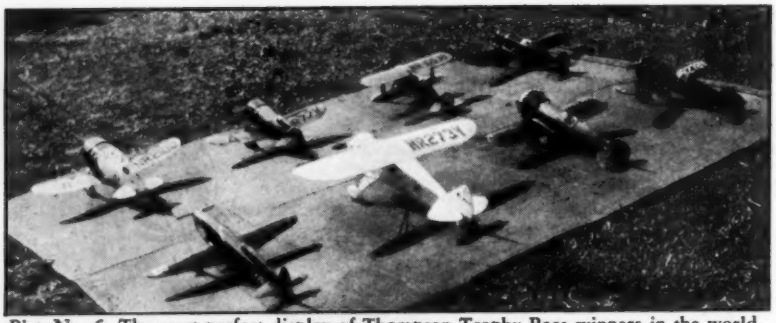
Pict. No. 2. Here is a 65 m.p.h. speed job by Earl Stahl. It weighs only 1.8 ounces. The wing is 64 square inches in area

Pict. No. 1. A perfect detail scale model of a Boeing P-26 by James Mackay. A unique feature is the real wire bracing. The wings and tail are covered with sheet balsa



Pic. No. 4. A photo of a scale model Waco, taken by Alfred Hilton. A red filter was used to bring out detail

Pict. No. 5. A photo of the same ship shown at the left, taken with a blue filter. Note the difference



Pict. No. 6. The most perfect display of Thompson Trophy Race winners in the world. It required 4655 hours for Mr. Charles Evers Jr. to build them. Can you name them?

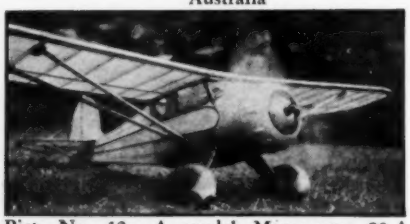
Pict. No. 7. A flying scale Lockheed Vega "on its way." (Not posed.) Built by Wm. Withey

Pict. No. 9. Members of the "Singalong 9 Cylinder Club" of Manila, Phil. Islands. Their flights are comparable with model flights in America

Pict. No. 8. A mid-air crash and parachute jump faked with two scale models and a miniature "chute" by D. F. Buist

Pict. No. 10. Model fliers preparing their models for flight just before the National Contest at Leghorn, Italy

Pict. No. 11. Harry Cooper's detail scale China Clipper floating on the surface of a lake in Australia



Pict. No. 12. A model Monocoupe 90-A warming up in Brazil, S. A. Built by Otto Dunhofer

lend Place, Edinburgh 8, Scotland.

We make a most urgent request. When submitting pictures to be published in the Air Ways columns will all Air Ways Club members please give their membership number, and if they belong to a unit, their unit number.

A very striking heading for our Air Ways column, in the form of a drawing of the Bristol Blenheim Bomber, has been sent to us by Norman Barker of 139 Evans Avenue, Toronto, Ontario, Canada. Barker has displayed real talent in the technique of his drawing. He may be placed in the first rank of our airplane artists. The Blenheim Bomber is a three to four place ship with a speed of 275 miles per hour.

One of the most unique models, a picture of which has come to us this month, was sent by James H. Mackay of VMS-1, Aircraft One, Quantico, Virginia. It is a Boeing P-26, shown in picture No. 1. It is built to a ¾" scale and has movable controls and complete internal details. The most unusual feature of the model is the wire bracing. In this case we mean wire, not thread. The fuselage is filled in with wood and the wings and tail are covered with balsa sheet. It is a most excellent piece of work.

Our speed plane artists have been busy again. Mr. Earl Stahl of 810 Suter Street, Johnstown, Pa., sends us picture No. 2, showing his 65 m.p.h. speed job. It weighs only 1.8 ounces, which, he says, is probably the cause of its high speed. The body is made of sheet balsa and the wing is of the built-up type with an area of 64 square inches. At the end of the flight the tail portion of the fuselage, which fits loose, allows the ship to come down in a spin. This, Stahl says, is much easier than the glide of most speed planes.

A little hint might be given here concerning the design of speed planes. We know this ship is a high wing. However, if the ship were built with a low wing, the wing being set at 0° angle of incidence and the stabilizer at 0° or minus 1° incidence, the ship would have a tendency to stall or mush in at the end of the flight, rather than dive in with the result of a crash landing. In other words, with this set-up, at the end of flight, when the ship is gliding, the tail drops and the nose raises allowing the ship to pancake into the ground. It has the added advantage of eliminating any tendency of a steep climb at the beginning of the flight. Low wing planes usually take off with very gentle climbs and continue in a straight path until the end of the flight, at which point they mush in. This is the ideal type of flight for any speed ship.

Here we have an unusual duration plane, shown in picture No. 3. Most duration ships have high aspect ratios. However this one has an aspect ratio of only six to one. The ship was built by Lawrence Nagle of 325 North 10th Street, Allentown, Pa. He says:

"This ratio does not seem to detract from the stability of the model and it has a long flat glide. On its first flight the model flew for only 1½ minutes. After a change in adjustments it was given 800 turns and climbed steeply until it flew out of sight after 12½ minutes."

Nagle has built another plane just like this one and he says it performs just as well. As yet, he hasn't lost it. We are proud to have Nagle as an Air Ways Club member.

General specifications for the plane are: Span of 30 inches; chord of five inches; fourteen inch propeller; weight, three ounces and twelve strands of ⅛ inch flat rubber is used for power.

Here we have something for the model builder interested in photographing his planes. Alfred Hilton of Murphy, California, sends us pictures No. 4 and No. 5, which are two views of the same model.

Picture No. 4 was taken with a red filter over the lens of the camera and picture No. 5 was taken with a blue filter. In the photographs submitted picture No. 4 was very much lighter than picture No. 5, and the plane showed up in greater detail. Due to the reproduction through the medium of cuts and the use of ink in printing the magazine, the

(Continued on page 59)

SCIENTIFIC IS TOPS FOR GAS MODELS, ENGINES AND SUPPLIES

ASK YOUR DEALER FOR THESE GAS MODELS, or SEND YOUR ORDER DIRECT. SATISFACTION GUARANTEED.

MISS AMERICA

Wingspan 7 ft. Length 54 in.

A prize winner in many recent gas model meets. A reliable, consistent performer which repeatedly comes in among the leaders. Kit is complete with every item required, including 3½ in. Pneumatic Rubber Wheels and finished hardwood gas model prop. Ask your dealer for Miss AMERICA or send your order direct. Complete kit....

$9.50 Postpaid Less Motor

Biggest Kit Value Ever Offered In the Gas Model Field

RED ZEPHYR

Wing span 72 in. Length 56 in. Weight (less motor) 2½ lbs.

This model holds the Championship of France and also won twice at the Quaker City Gas Model Meet last September. The most complete perfect and easy to build model ever offered at this low price. Full shock absorbing landing gear with special brackets and vibration absorbing motor mount. Kit includes 3½ in. Pneumatic Rubber Wheels and all parts of materials required to build entire model. Full size plans with every detail pictured and explained. Ask your dealer to show you the RED ZEPHYR or send your order direct. Complete kit

COMPLETE EASY TO BUILD AND GUARANTEED FLYER

$6.95 Postpaid Less Motor

MISS PHILADELPHIA

Wing span 96 in. Length 57 in. Weight (less motor) 3½ lbs.

This is a duplicate of Maxwell Bassett's famous winning model at the Detroit Nationals and other contests. Kit includes everything required including 3½ in. Pneumatic Rubber Wheels, finished hardwood propeller, ready shaped leading and trailing edges with notches ready cut and finished balsa ribs with notches for spars. Complete plans and detailed instructions explaining entire construction. Ask your dealer to show you Miss PHILADELPHIA or send your order direct. Complete kit

$9.95 Postpaid Less Motor

HURLEMANN SPARK PLUG
Comes apart for cleaning. Leakproof. Each 75c

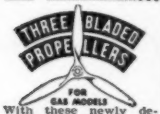
SCIENTIFIC GAS MODEL FINISHES

The finish on a gas model does a great deal in making a successful model. Don't take chances with inferior low-priced finishes. Buy the best. Clear Nitrate Dope, Colored Nitrate Dope, Nitrate Thinner, Gas Model Cement, Regular Cement, Bamboo Paper Cement, Banana Oil.

3 oz. bottle	$ .25
½ pt. can	.50
1 pt. can	.75
1 qt. can	1.40

for all motors. Special, each $1.95

TRU-PITCH GAS MODEL PROPS
Accurately carved with hole drilled. Made of clear hard wood in 13 and 14 in. sizes. Look for the name "SCIENTIFIC TRU-PITCH" stamped on every prop. Each 99c



With these newly developed 3-bladed propellers you can get more efficiency, speed and power. You can use a smaller diameter propeller and get better results. Eight sizes—9", 10", 11", 12", 13", 14", 15", 16". Any size, each $2.95

FLY A 3-foot GAS MODEL WITH THE TROJAN JUNIOR GAS MOTOR

This small 3½ in. engine gives tremendous power and durability in its small size. Entirely new features of construction. Complete ready to run with coil, condenser, propeller, supply of oil and Double Guarantee. Mounted on skids. Postpaid $18.50

THE NEW WARRIOR

"With the finest features in model engines." Aluminum Piston with two Piston Rings—Adjustable Spark Advance—Needle Valve Extension—Steel Cylinder, Aluminum Crankcase—Champion Spark Plug—Special Coil. Engine runs perfectly in upright or inverted position.

½ H.P.
4½" high
⅞ bore
COMPLETE Ready To Run

$12.00 Postpaid

Mighty Midget Engine

The motor sensation of the year. A speedy lightweight engine that gives remarkable performance in any medium size model. Complete with condenser, coil, and spark plug.

Upright model.....$14.00
Inverted model..... 17.25

GWIN AERO ENGINE

Another sensational engine equipped with Hi-dome piston and exhaust manifold. Assembled and block tested. Complete with condenser, coil and spark plug.

Upright model.....$17.50
Inverted model..... 18.25

BUILD YOUR OWN GAS ENGINE

Save money by ordering the Mighty Midget or Gwin Aero engine Construction Kit. Assemble it yourself. All parts machine finished and guaranteed perfect.
MIGHTY MIDGET Upright Kit $9.85—Inverted Kit.....$10.10
GWIN AERO Upright Kit $11.35—Inverted Kit.....$11.60

NEW SYNCRO AcE

A low priced streamlined motor with plenty of power. Superior approved type timing placed above grime and wire interference. Factory tested, complete ready to run including coil, condenser, and spark plug. Postpaid.....$15.00

MODEL BOAT ENGINE

The ideal model boat engine. Air-cooled and efficient at high speeds. Easily adjusted; capable of full power, runs at top speed. Completely assembled and block tested on special skids. $17.75 Postpaid. Construction kit complete with flywheel. Postpaid.... $11.40.

New 1938 OHLSSON ENGINE

This new model is vastly superior with many improved features including an enclosed timer which is absolutely foolproof. New lugs on sides of motor permit any type of mounting, radial or otherwise. No advance in price. Complete ready to run with coil, condenser, and free propeller. Postpaid $18.50

THE CHUNN "CHUM"

New 3½ oz. motor for 3 to 5 ft. models 1/10 H.P. Easy starting and delivers sufficient power to fly models up to 2¼ lbs. Complete Postpaid $17.50

FREE—PROPELLER, OIL & DOUBLE GUARANTEE WITH EVERY ENGINE

FLIGHT TIMER

Small size, weight 2¼ oz. Adjustment 0 to 120 sec. Silver contact points, vibration proof, accurate. Easily mounted in any position. Each $3.00

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For quick starting and reliability. Each 75c

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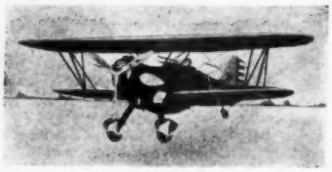

21 — Famous Curtiss Hawk Pursuit


10 — Sopwith Camel


13—Rickenbacker's Spad


26 — Heath Parasol


14 — Fokker Triplane


58—Popular Ryan Sportster—Rep.


12 — Bishop's Nieuport


38 — Lincoln Sportplane


66—Graceful Stinson "Reliant"—Rep.

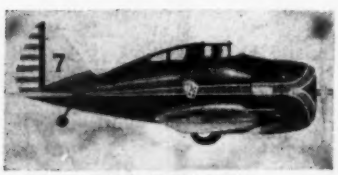

22 — Curtiss F9C-2

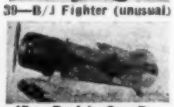

6 — Polish PZL Fighter


41 — Vought Corsair


39—B/J Fighter (unusual)


52 — Howard's "Mr. Mulligan" — Rep


61—Seversky P-35 Fighter

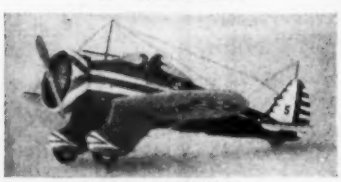

17 — Bayle's Gee Bee


18—Howard Racer "Pete"


63—Detroyat's French Caudron Racer


65 — Lockheed Electra


19—Supermarine


60—Boeing P-26A Fighter


20 — Hawker Super-Fury


45 — Hi-performance U.S. Army Martin Bomber


5—Laird Supersolution

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5	Laird Super-Solution	1.95	.65	41 Vought
6	Polish Fighter	2.50		42 Rowa
7	Curtiss Helldiver	2.95		43 Dougl
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9	Scouting SE-5	1.95	.55	45 Martin
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16	Albatross D-5A	1.95		52 "Mr.
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21	Hawk P6-E Fighter	2.50	.95	57 Old G
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23	Boeing P-26 Pursuit	1.95	.70	59 Hawke
24	Lockheed Vega	2.50	1.20	60 Boeing
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27	Doolittle's Gee-Bee	1.95	.65	63 '36 C
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...2	Custom Waco C6		1.10	
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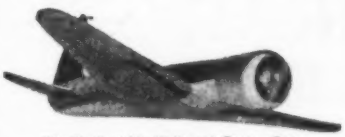

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43 — Ever Popular Douglas O-38 Observation

46 — Laird's "Solution"

47 — Wedell's W. Wms.

48 — Turner's W. Wms.

7 — Curtiss Hell Diver

50 — Curtiss Exp. Hawk

68 — Bristol Fighter

37—Waco Cabinplane

38 — Buhl Bull-Pup

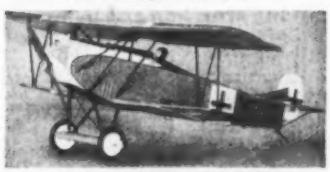
40 — Aeronca C-3 Sport

27—Doolittle's G-B

25 — Cur. A-8 Attack

4 — Curtiss "Jenny"

35 — Boeing 247 Transport



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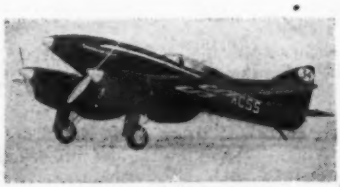
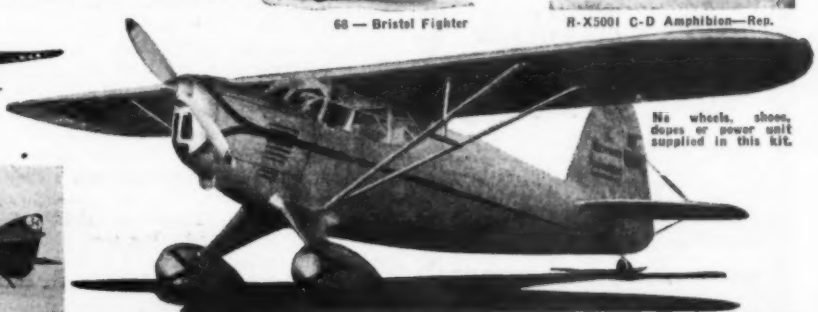


51—DeHavilland Hi-Speed Comet



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...an Special (Gulfhawk)

...ery well detailed. With ...tractable landing gear. ...rgain at the price. Dry ... except no liquids) .85c.

A Prize Winning Catapult Glider

(Continued from page 8)

fuselage consists of a sheet of very hard ⅛" balsa in the center with another sheet of ⅛" medium-hard cemented well on either side. The correct cross-sections for the different stations are illustrated on the plans. The launching hook is bent from .040 music wire. Note that it curves around to the top to protect the nose. It is bound in place with thread and the joint covered with a cement skin. Three coats of glider polish are applied to the whole ship which is finished down with very fine sandpaper.

The model is adjusted to circle to the left, thus when it is caused to bank right on the launch it will describe a figure "S" curve which is advantageous in gaining altitude.

Upon the launch the speed is tremendous, but it is surprising to note how the model slows down to the soaring speed. Be sure to adjust the model via a hand launch before trying a catapult launch. It is best to fly the model in an open place free of a great many spectators, since it is quite dangerous should it be out of adjustment at its high speed.

How to Control Your Plane by Radio

(Continued from page 7)

It should be said here that the present radio control system utilizes rudder control alone. No attempt is made to manipulate elevator or ailerons—although that could readily be done by the addition of auxiliary channels. It was Hull's original conviction—amply supported by later trials—that any ship with sufficient inherent stability would be able to take care of itself longitudinally. If there were lift, it would climb. If there were no lift it would descend, at its normal gliding angle. The sole requirement, then, would be directional control, to keep the ship into the wind, away from trees, etc.

Perhaps this point should be amplified further. The principle applies to gas models as well as soaring planes. All that is required is sufficient inherent stability to keep the ship flying in normal attitudes. Then when the power is on it will climb. When the power is off it will descend—not in a dive, but in a smooth glide to a landing. If it does not perform like this there is a basic defect in the design or the adjustment is incorrect. Witness the performance of the original KG model, as an example—four years old, and still making perfect flights without once a serious crack-up.

So much for the argument concerning directional vs. other means of control. There's one other point to get cleared up. That concerns the necessity for going through one control position to get to the other. Obviously, the escapement in this control system rotates in only one direction. Suppose the rudder is in neutral. A single impulse from the receiver moves the rudder into left position. The next pulse puts it in neutral again. Then comes right rudder, and again neutral. But then if some more right rudder is wanted it is necessary to go through left rudder first before right can be reached.

This seems like a real weakness, but in practice it has been found of little consequence. The whole operation can be performed so rapidly that the rudder seems merely to wiggle and the ship responds, if at all, with nothing more than a slight flicker. Considering that the ship flies at perhaps 25 miles per hour, and the rudder has sufficient area to exercise sharp control, this seems a thorough test. Even with sensitive gas models no difficulty is anticipated on this score.

And now back to the control mechanism. The next step in the chain is the receiver itself. Oddly enough, considering that the work was being done by one of the world's foremost authorities in this particular kind of radio work, more difficulty was experienced here than with any other part of the system.

The trouble was, of course, that very tiny batteries and low potentials were necessary in the power supply in order to keep the weight down and it became difficult to get any appreciable current change. The use of a sensitive intermediate relay operating on a current of a milliampere or two which actuated the control electromagnet was, of course, essential, but even this plate current change was found extremely hard to get with a plate voltage of 45.

Passing over the numerous experimental layouts which were tried and rejected, the circuit of the receiver now in use is shown in Fig. 2. It has several advantages over its predecessors, one being that it operates from the r.f. carrier and not from superimposed modulation. The latter system is easier to make function but complicates the transmitting equipment and requires continuous transmitter operation, a disadvantage with mobile transmitter units operated in a car.

The detector tube is a Type 30 in a super regenerative circuit, operating on 56 mc. A 1B5, chosen because of its high amplification factor, serves as intermediate audio amplifier, the diodes being left floating. The output tube is a 1F4, the only tube which will provide sufficient plate current change to operate the relay. In operation, the supering rush from the detector, rectified, serves to bias the 1F4 until its plate current is about 0.6 ma. A transmitted pulse of carrier cuts off this rush noise and the plate current rises to about 2 ma. This change is ample to close the relay provided the tension spring is carefully adjusted.

That's just about all there is to it. No antenna is used; a 30-watt transmitter a mile away will actuate the relay without one. A short length of wire taped to the fuselage can be used if desired.

The transmitter is a simple push-pull affair using a pair of 45's (filaments in series on 6 volts) operated in a car from a 300-volt 100-ma. Mallory Vibropack, with a collapsible half-wave horizontal doublet antenna. A 6A6 rig with even lower power would be quite satisfactory.

With the control system functioning and everything in order, the next problem that arises is transmitting the wishes of the pilot in a simple and unconfusing fashion. The first attempts utilized an ordinary telegraph key—a single dot for left, three for right, and so on. This led to hopeless confusion—and several inadvertent crack-ups! It was simply impossible to remember what came next.

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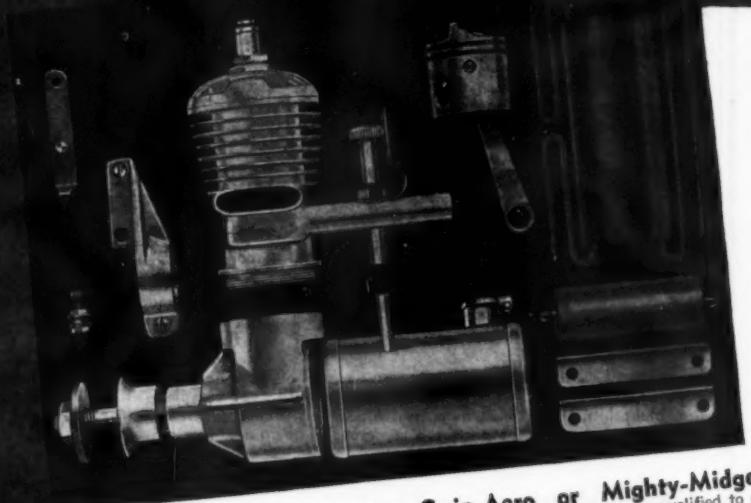

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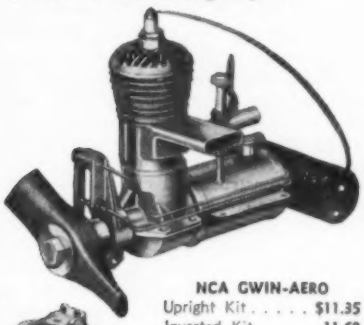

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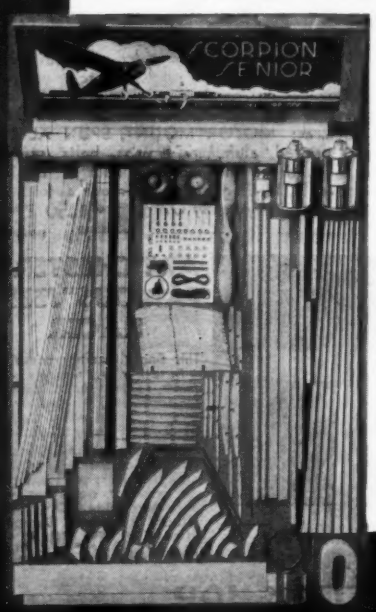

Scorpion Senior as built from kit.

Scorpion gas models out-fly and out-class **all** gas models. Wt., 3 lbs. Wing, 57 inches. Length, 41 inches.

MASTER KIT—Contains plans, instructions, all finished and shaped parts as illustrated. Includes "Autoknips" duration timer, 3½-in. pneumatic wheels, shaped balsa cowling, full pint regular cement and 1 pint dope. Also switches, terminals, ignition wiring and all fittings to install motor and prepare model for flight. Postpaid, **$10.50**

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Then a control wheel equipped with a ratchet allowing it to turn in only one direction, with four contacts at the 90° points and a handle to show direction, was built. This was much more successful. Another method—and the current favorite—is the "rudder stick" shown in one of the photographs.

The necessity for having a direct-acting control device that does not lead to confusion will be evident during the first attempt at control while in flight. Flying this ship is no child's play. It is simple enough when the ship is near by and the rudder movements can be seen. But steering it past a tree in an up-wind turn a quarter of a mile away—well, that's a different matter. Look out the window and visualize steering a car five blocks away traveling around a corner at 25 miles an hour by radio control and you'll see what I mean.

But it can be done, and when you have mastered the technique you'll have entered one of the most thrilling and fascinating games there is. They say that soaring is the "King of Sports," and even power flying is no bore. Then think of the inimitable thrill of seeing your own ship dip and turn off up in the blue in instant, precise response to your slightest whim!

A few constructional details:

The radio-control equipment should be built on a small plywood base firmly screwed into the fuselage framework. "Shockproof" spring mountings have proved uniformly disastrous to tubes and equipment, the "plunge" of the gear in such a mounting when landing being much greater than the landing shock in the fuselage itself.

The batteries used in the present equipment are, for "B" voltage, the Burgess W30BPX or Eveready X203, weighing about 10 oz. each, and for filament and electromagnet solenoid supplies, ordinary 1-inch flashlight cells. The latter were chosen not only for lightness but because of their inexpensiveness and general availability.

Some difficulty has been experienced with microphonic tubes, the shock of the escapement releasing proving sufficient to trigger off another pulse of plate current and moving the rudder an additional step. The only cure for this to date has been to select tubes for non-microphonic qualities. Possibly an almost rigid spring suspension mounting for the tube would be an answer.

The choice of control wires presented some early difficulty. Cords, even of heavy fishline, were too prone to stretch, yet wire could not be made to travel smoothly over the pulleys. The answer lay in using a few inches of cord right at the rudder bar end, where the control cable traversed the pulleys, splicing into lengths of wire for the long run back to the rudder.

Originally the rubber control motor was wound with a winder through a hole in the rear of the fuselage. Now a small crank has been attached to the escapement. The motor is ordinarily left wound with the remaining turns after a flight—not so good for the rubber, but it's easier to replace a motor once a month than to wind and unwind it every day.

The number of strands in the rubber motor will, of course, depend on the force required to move the rudder. Six strands

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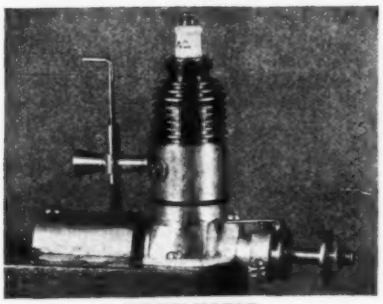

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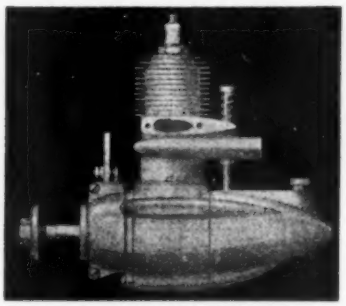

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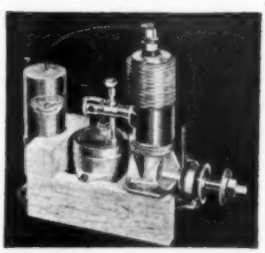

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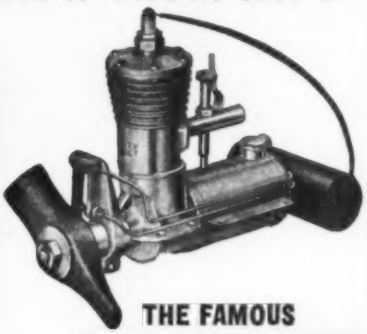

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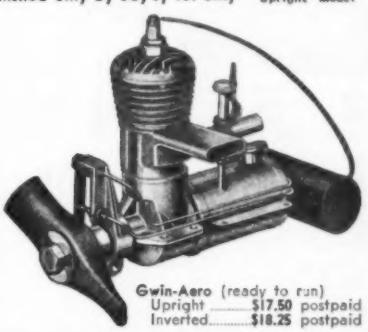

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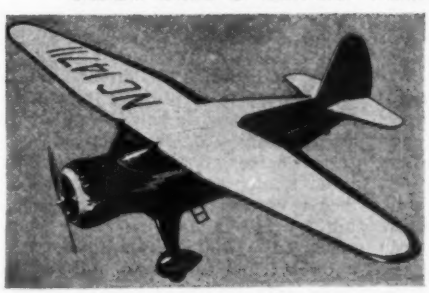

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Span 6' 11¾"—Length 53"—Weight, ready to fly, 3 lbs., 14 oz. Boy, oh Boy! What a beauty, and plenty of wing surface to make it glide in at a slow speed. Chord at root, 15⅝". And is this kit complete? Spun alum. cowl, all ribs, formers, wing, elevator and rudder tips, etc., cut to shape. Leading edge and spars tapered to shape, switch, sheet alum., all liquids. FULL SIZE blue prints, pants, semi-finished, license numbers, and many parts too numerous to mention. Colored Black and Yellow. Price of this deluxe kit with M & M Air Wheels **$14.50**
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were used in the present model, providing complete reliability.

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As has been said above, it is a federal offense to operate any form of radio transmitting equipment without operator and station licenses. The maximum penalty for such unlicensed operation is two years in a federal penitentiary or a fine of $10,000—so don't take any chances! Get a licensed ham to work with you. He'll be glad to cooperate, and he'll be able to help you out with the purely radio problems that might otherwise stump you completely. And you'll both get a whale of a lot of fun out of the sport.

For sport is just what it is. "Radio-control of aircraft"—if not the "King," then the "Crown Prince of Sport!"

Building Your Career in Aviation

(Continued from page 9)

for sale for a small sum and can be secured upon application.

The libraries in the larger cities subscribe to foreign aeronautical journals. These periodicals furnish a source of news which are international in their character. Catalogs and factory trade organs are also useful adjuncts and serve as a source of valuable information. These can be obtained upon formal request to the various concerns.

The design handbooks of the Army and Navy are confidential. They are issued to universities and factories specializing in aircraft design. In many cases, access to these publications between class room use can be made available to interested persons provided that proper application is made to the authorities in charge. It is the writer's experience that if the student is diligent and earnest in his purpose, the authorities in charge will be glad to make this material available for limited periods.

The pursuit of knowledge is something that is a personal equation. There are several things that must be adhered to in order to study properly. A definite program must be established and adhered to as to the hours. This should be habitual. It should not be overdone as to length of the time because too much effort wastes the student's acquisition. The room should be quiet. The time devoted to study should be habitual. The surroundings should be orderly and preferably the student should devote a table where he can sit upright and in comfort. A notebook should be available for writing down facts which are important. A list of subjects should be made and an investigation conducted as to what supplementary material may be necessary and essential to balance the study program. Personal discipline plays an important role in a program such as this. The significant thing to remember is that once the fundamentals are learned, then the supplementary material will assume a definite place in the study program. After this knowledge is acquired, the opportunity to use the knowledge acquired in a practical way has to be exploited and pushed to completion.

In line with a home study program concerning aeronautics, there are several things which will aid the student. Frequent visits to the airport are helpful. The atmosphere and the background which make up commercial aviation can be studied at close hand. Visual inspection of equipment cannot fail but to give the student a firmer grasp on the problems involved in aircraft construction. Membership in a good flying organization or club is also advised. Learn the nomenclature and terms which apply to aircraft.

A good glossary of flying terms or a good aeronautical dictionary are indispensable. Learn to remember definitions of the component parts. This will be helpful in examination work. Secure text books which are written in the question and answer style. This type of material imbues the student with the question and answer in a manner which permits the subject to be firmly fixed in the mind.

There is nothing essentially new in airplane manufacture. All of the production and methods are an evolution from other industrial fields which have served as the precedent. A working knowledge of foundry practice, forging, die casting, machine shop work, lofting, die and punch press technique, welding, heat treatment, purchase and acquisition of materials, metallurgy and time study of the various operations is vital to the individual whose field encompasses shop work. These processes are all established and the material covering such subjects is plentiful. The trick comes in applying this knowledge so that it can be adapted to airplane work. For instance, if the student is interested in both design and shop work welding, then a study of jigging, metallurgy, heat treatment, deforming, fatigue and the assembly are the subjects to be investigated. In short, what the writer wishes to emphasize is that the entire background must be explored in order to make the individual fluent with all aspects of the problem of welding. Then the problem of welding becomes less complex.

Finally, after the mechanical theory has been mastered, it is essential that the individual keep abreast of the times by a constant reference to the latest available technical data. This prevents a person's ideas from becoming obsolete. A notebook or binder kept up to date with sketches and notes is an important adjunct to the student or workman. Writing the subject down and sketching the details firmly establishes the whole idea in the mind. This is the real purpose of notebooks.

The vital point of this discussion is that it is difficult to secure your first position in the industry where full use of your available knowledge can be made use of. If your first job does not give you this advantage after a reasonable length of time, then resign and seek a place where the full benefits of your knowledge may be employed. In this respect one has to know his limitations and talents. Sometimes this means a constant shifting around but after all to succeed means that you must overcome whatever competition is placed in your immediate path of progress. Sometimes this policy takes time to prove fruitful but in the final analysis it will amply repay the individual to be careful in choosing his employment. If a person cannot have a

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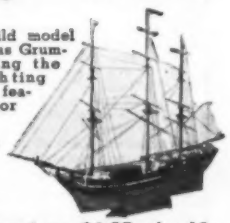

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chance to compete in the highly competitive social system, by full use of his talents, then one is bound to be mired in the mediocrity of being just "average." Unfortunately in the eyes of an executive, the average is a rather low entity, and to be classified in that group spells disaster to hopes and aspirations.

Build and Fly Bucker Jungmeister

(Continued from page 25)

Tail Surfaces

The tail surfaces are constructed with spars and ribs of 1/16" square balsa. The outline of the rudder and the stabilizer tips are 1/32" square bamboo. After the leading and trailing edges are attached pieces of 1/32" x 1/16" balsa are added to the top and bottom of each rib and sanded down at the ends as shown in the detail drawing of the rib. This construction makes a very rigid tail surface that will not warp. The tail wheel and fork can be built from scrap wood. The wheel need not turn.

The propeller is cut from a block ¾" x 1-¼" x 8" and is of conventional shape. Six or eight strands of ⅛" flat rubber should be used. The stabilizer is set at one degree positive incidence. The rubber should be put into the fuselage by slipping it over a piece of 3/32" square balsa about 17" long and inserting it through the nose block.

The original model required a small amount of weight in the nose but if the nose block is left solid probably no weight will be required. The tabs will help for making minor adjustments. The model has shown itself to have a steep climb and a flat glide. R.O.G. flights of 30 seconds are made consistently. With the use of a winder, hand-launched flights of a minute or more can be attained.

A Low-Wing Indoor Winner

(Continued from page 14)

as long as a microfilm job. This was quite a handicap to many since tissue is much heavier in weight and does not have as smooth a surface as film. The winning fuselage flight was that of the author's model. The time was 8:35 officially and later in the afternoon this design turned in a flight of 11:17 unofficially which is excellent considering the fact that the ceiling available in the Butler University fieldhouse was 75 feet plus the hanging lights.

Many things were learned in the flying and building of this ship. Among them a large stabilizer that is used helps to make this ship very anti-stalling. A slight amount of down thrust also does likewise. The design employed is a swept forward low-wing cemented directly to a triangular fuselage with the apex on top. The stabilizer area is 50% of the wing area. A low cambered airfoil is helpful in bringing the ship out of dives and other maneuvers when hitting lamps, wires and other obstructions while in flight. The swept forward wing and the placing of the large fuselage cross section at the trailing edge of the wing was conceived by Walter L. Brock who has been club director of the Illinois Model Aero Club for the past twenty years. Microfilm fillets were originated by the author about two years ago. The method explained in detail at the end of this article has proven to be excellent for streamlining purposes on indoor models especially the fuselage type where the wing joins the body. Due to their lightness they can also be used to advantage in filleting the stabilizer and rudder to the tail boom.

To begin, it would be advisable to make a full sized outline of this model on a sheet of drawing paper, 24"x30". Better still, using a sheet of tracing paper, trace the outlines as desired from the pages of this magazine.

Fuselage

Build the bottom of the fuselage on the drawing, first being sure to line up the longerons and spacers evenly. It might be noted that the fuselage is triangular; this accounts for its being simpler and lighter to build than the conventional square fuselage. Sand 6 strips of 3/32" sq. balsa to 3/32" round x 16" long. The cross braces are 1/20" x 1/16" on edge, that is with the narrow edge outwards. After making the bottom side, build the third longeron and cross pieces directly over it and at the same time line up all pieces evenly. Next make the nose and rear plug out of 3/32" sheet balsa. The fuselage is braced with silk thread split three ways. Using about three feet of thread, glue the end to the nose twisting the fuselage around so that it is wrapped from corner to corner around the fuselage and back to the nose again. Using a thin light cement, put a dot of it at each corner where the thread contacts the wood. Now make the tail boom which is 10" long, out of a piece of 31/21b stock 1/16" sheet balsa. The dimensions of this boom, as noted on drawing are 1⅛/ x ⅞" x 10" tapering to a point at the tip. Lastly sand the complete fuselage and boom lightly with number 10/0 sandpaper. A good grade of emery paper will do nicely.

Wing

Cut 4 wing spars 15" long from 3/32" sheet wood. Sand slowly to a round shape at the center of spar measuring 3/32" in diameter. The spar gradually tapers from 3/32" to 1/16" round at tip. Next make a template of the rib shape as noted on the plan. Cardboard can be used for the template shape. Cut 18 ribs slightly more than 1/32" sq. out of 1/32" sheet balsa. The tips are made of 1/20" sq. sanded slightly round. Bend to correct shape. Many ways have been used in bending strips to the shape desired. Try an electric curling iron or electric soldering iron. Both are excellent for this work.

Pin the leading and trailing edge spars to the drawing; cement the ribs in between them evenly. The ribs are cut at the trailing edge to fit the taper of the wing. Then cement the tips to the spars fitting them carefully. It is advisable to allow five minutes for the wing to set and dry. Upon drying, remove from the plan and sand all glue joints lightly to remove burrs. Lay aside the wing and fuselage to be covered with film later.

Tail

Bending the stabilizer and rudder is simple. Use the curling iron method as mentioned before; bend the design on the drawing. Rudder and stabilizer outlines are made of 1/16" x 3/64". These strips

are sanded lightly to a streamlined section. Pin to the drawing and cement the ribs in place. The rudder ribs are cambered. The arc of the camber facing to the right on the model. That is, so that the ship will circle to the left or with the torque.

Covering

The model is covered with microfilm. Cover the wing first, taking care, for if it's as lightly constructed as the wing on the original model it will undoubtedly be a bit difficult to cover. Put 3" of dihedral in the wing when it is glued to the body. Using a fine brush, cover the top of all the ribs with a thin film of water. This strengthens the wing and also prevents the film from tearing easily when the ship strikes various objects while in flight. Next, cover the fuselage. Be sure to use a slightly heavier film on the fuselage. This helps to strengthen it a lot. It is suggested that a thin film be used on the stabilizer and rudder for they are apt to warp if too strong a film is used. Should the film on any part of the ship appear wrinkled, hold such a portion suspended about 4" above the curling iron until the heat has tightened the film sufficiently to make a smooth surface without warping the model out of line. It is best to do this when the ship is completely assembled for by using this method and applying the heat correctly the model may be lined up as desired.

Propeller

The large propeller as can be seen on the photographs was adopted mainly because of its slower r.p.m.'s. which were about 100 a minute. A smaller prop with a pitch of 28" may be used if a steeper climb and a higher ceiling is desired.

The prop construction details are as follows; to begin, cut the prop block which is 8¼" x 1" x 1½". Proceed to cement the two halves together at the vortex of each overlapping about ¼" at the joint. Be sure to allow the cement at hub to dry thoroughly before beginning to carve the prop. After carving the prop in the usual way, the specifications should then be roughly 3/32" x ¼" at the hub gradually tapering to 1/16" at the tip. Then shape the blades to the outline of the plan. Cut out the center of each half so that there is left remaining a strong balsa outline 3/32" wide around each blade. The size of this balsa outline depends on the strength of the wood. If the wood is fairly hard with a straight grain a smaller prop outline can be used without fear of the prop breaking easily when striking objects while in flight. A larger section should be used if the wood is soft. Then sand to ¼" x 1/16" at the hub and the complete outline to 1/16". Cement 7 ribs 1" apart to each prop half. Then cover the complete prop with film on the two sides of each blade.

Landing Gear

The landing gear is made of two spars cut from a 3/32" sheet of balsa and is ⅛" wide tapering to 1/16" round at the end. Axles are made of number .012 piano wire. Cement these to the spars. Next make wheel rims of two strips of photographic film 1/32" wide. Insert one spoke 1/32" sq. between each wheel after it is bent and cemented to the right size over a small bottle. Slip the wheels over the axles and put a drop of cement over the tip of each axle to hold the wheels in place.

Assembling and Flying

Cement the wing to the fuselage in its proper place. Notice that the landing gear is glued where the wing joins the fuselage. This means a stronger joint at that spot. Now cement the stabilizer and rudder to the boom making sure that they are exactly perpendicular to each other. Next glue the rear plug to the boom. The microfilm fillets come next. Be sure to have several large hoops covered with film handy, for quite a bit of film may be wasted before the filleting is completed. Next take one large hoop and using the hot iron, cut away as much film as desired, until a strip of film remains across the width of the hoop. Hold the model so that this strip, about 2½" wide, is suspended over the center portion of the wing and fuselage where the filleting effect is desired. Then, holding the model in one hand and a piece of cotton in the other hand, blow and press the film strip with the cotton onto the fuselage and wing until the best filleting shape is obtained. Do not be discouraged if this method does not work properly at once, for a very great deal of practice is necessary to place this film strip on the model as desired. After filleting the wing on both sides of the fuselage, top and bottom, fillet the stabilizer and rudder to the tail boom using a film strip about 1½" wide which is several inches longer than the chord of the stabilizer. The results obtained depend entirely on each builder's skill. This is a test worth trying again and again for when looking at the finished product a pleasing effect is present, for the film flows smoothly over the wing and fuselage and streamlining is again king. Slip a loop of ⅛" x 1/30" brown rubber 22" long into the fuselage; attach the prop and wind the motor up to around four hundred turns. Using an "S" hook attach the rubber to the rear plug hook and set the plug in place. Hold the ship in the right hand between the two fingers at the rear plug grasping the prop with the first two fingers of the left hand; release both hands at once. This model should climb steeply without stalling. Counteract a possible stall by increasing a small amount at a time, the down thrust of the prop. The model should take off slowly and turn in small circles of about 35' in diameter, the circle may be larger

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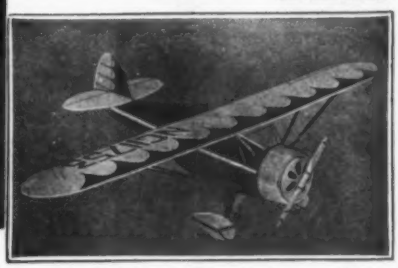

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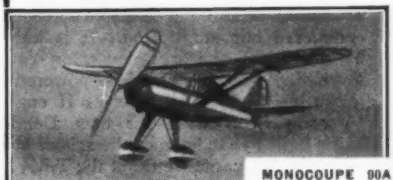

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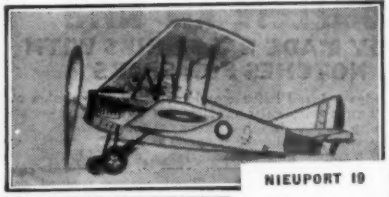

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or smaller, depending upon the setting. Should the model have a tendency to dive, the tail boom may be raised a small amount at a time by cementing a piece of balsa about 1/32" square to the base of the rear plug.

The writer has obtained over eight minutes consistently with this ship flying in a gym with only a 30 foot ceiling. As mentioned before, the wing halves are cemented directly to the lower longerons. Under full power the rubber twists the fuselage. In doing so, this twist increases the incidence on the left wing. This incidence, by creating more lift on this left wing, prevents the wing of the model from "washing out" easily at the start of a flight when the ship is under full torque. With the proper adjustments, especially the rudder setting, a very steep climb and a more even circle is obtained from start to finish of a flight.

Remember that neatness and patience in building and flying will go a long way towards making your low-wing model a successful one.

On Frontiers of Aviation

(Continued from page 12)

this change we may see many new foreign racers. It has been this race that resulted in the development of Caudron speed planes.

Many are now clamoring to make the King's Cup Race in Great Britain open to special built racing jobs instead of stock sport models. It is now a handicap event and as far as the spectator is concerned he does not know who is ahead or behind until the race is over or reads it in the paper that evening when he gets home. If it becomes open for special ships we are bound to see small racers developed like those of our own and of course hope it will be an international competition.

This year Mr. Charles Gardner won it for the second time straight in a Percival New Gull which is very close to the point of being called a racer. It and its breed are described later in this article.

An excellent little ship built by students of the DeHavilland Technical School conquered our admiration. It is known as the T.K.4 and is a low-wing cantilever single-place monoplane powered by a 140 hp. Gipsy Major Series II engine. In comparison with our own Delgado racer built by students of the school bearing the same name we think the T.K.4 has it beaten. We would like to see now how the students of the Curtiss-Wright Technical School of Aeronautics will fare with the construction of Harry Crosby's new racer. The T.K.4 has a controllable pitch prop, retractable landing gear, split wing flaps and wing tip slots. It has a wingspread of only 19 ft. 8 in. and weighs 1,300 pounds fully loaded. It averaged 230.5 m.p.h. in the King's Cup Race and lands at about 65 m.p.h., which is a very good performance. It will do up to 235 m.p.h.

True to racing tradition a newly designed Miles Hobby was being completed just before the start of the race. It is of the same general type as other Miles' ships only cleaned up considerably for racing purposes with the inclusion of a retractable landing gear. America's most

recent racing plane at this time is the Bellanca tri-engined mid-wing of Alexis Papana's. A 12-cylinder V-type Ranger engine of 420 hp. is in the nose with two 250 hp. in-line inverted Menascos in the wing which give the ship a cruising speed of 225 m.p.h. and a top speed of 250 m.p.h. and flies most efficiently at about 12,000 feet with 900 gallons of fuel. Hamilton controllable pitch props are used. Wing span is 46′ 4″, length 27′ 8″, wing area 282 sq. ft., empty weight 4,483 lb., useful load 5,192 lb., and a gross weight of 9,675 lb. Originally designed for two pilots the ship now only has room for one when equipped with the many instruments needed for long range flights. A Western Electric two-way radio with two wave length has been installed. The landing gear retracts backwards into the nacelles of the Manascos. Though much different in type from former Bellancas it still has features that mark it as a Bellanca such as the tail units which much resemble those on the single-engined Bellanca racer.

Details on Col. Roscoe Turner's new racer, the "Meteor" follow:

Overall length—23′ 4″
Height—10′
Wing span—25′
Wing area—95 sq. ft.
Ailerons—7.2 sq. ft.
Fin—4.3 sq. ft.
Rudder—7 sq. ft.
Elevators—10.7 sq. ft.
Stabilizer—11.1 sq. ft.
Fuel capacity—210 gal.
Oil capacity—20 gal.
Gross weight—(light load) 3,765 lb.
Full load—4,795 lb.
Weight empty—3,195 lb.

The "Meteor" has a landing speed of 95 m.p.h. The official designation of Turner's new ship is the Laird-Turner 14.

Mrs. Byrel Markham of trans-Atlantic fame is having a new ship built for a long-range flight using the Menasco 250 hp. Super-Buccaneer species of engine.

Another user of Manascos is a small amphibian developed by the Spencer-Larsen Aircraft Corp., of Farmingdale, Long Island. It "totes" a total of 125 horsepower.

New aircraft companies are springing up overnight in great quantities in the U.S. One of these companies which has cloaked itself in great secrecy has however not been able to cover up the fact that it is going to build a pursuit airplane and is expected to locate next door to the Timm Aircraft Corp. We think the name is the Beal Aircraft Corp.

Other notes with a militaristic trend are that North American Aviation Corp., is now completing the first of over 200 mid-wing O-47 observation planes for the U.S. Army. The design has been "cleaned" up especially in regard to the fuselage and should make the airplane very trim in appearance. A noteworthy fact about this airplane is that it gets its best operating speed as low as 5,000 feet. At this level it has a top speed of 235 m.p.h. with full load including a crew of three. At the same altitude it can also go at a very slow speed and therefore is an exceedingly fine airplane for observation work. Most pursuit airplanes today are

designed to produce their maximum at much higher altitudes and for this reason, if they are lucky enough to spot the O-47, they could only have one chance to make an attacking dive at it. If they miss the first time the North American will be too far away before the enemy pursuit can get into position for another try.

The new North American "Dragon" bomber is back at the plant undergoing refinements for the next bomber competition. North American's latest order is from the Army for 34 more BT9C basic training planes powered by Wright Whirlwind engines at a total cost of $411,500.

Reports have it that Grumman has a new fighter on the fire. Northrop was also working on a new super-super military plane until they closed shop which may be permanent. Most of the Northrop engineers have been taken on by Douglas so it may be that this new Northrop ship will come forth as a Douglas. It has been rumored that several small companies have been bidding for Northrop's factory.

Harry Crosby has solved one way of making an airplane equally as efficient for long-distance racing as well as on a closed course. Enlarged wing panels are to be designed and built to fit his present ship to carry heavier fuel loads for the Bendix Race and will use the smaller wing panels for closed course competition.

A newly formed Tipton Aircraft Company will soon produce a 125 hp. Menasco-powered two-place, high-wing cabin monoplane.

Flight tests have been very successful with the new sportplane built by the Pasadena Junior College for Jimmie Dunn, film actor. It has very trim lines and is of modern all-metal construction. However its initial climb on the take-off seems to be a bit slow because of the low power and large payload but this might be easily counteracted by a controllable pitch propeller. It is a low-wing four-place, full cantilever, cabin, monoplane with retractable landing gear and powered by a 145 hp. Warner engine. The engine is well baffled and the trailing edge of its cowl fits tight around the fuselage with only a small hole at the bottom as an air exit.

The first of the new four-engined Ju 90 Junkers transports has taken the air. It is powered by 12 cylinder, 1,000 hp. Daimler-Benze inverted engines which project from the large low wing of the 40 passenger transport. The ship is all-metal in design and when in flight with wheels retracted it has a very racy appearance. 21 tons is its gross weight but in spite of this it can top 255 m.p.h. and can do around 225 m.p.h. cruising. With the familiar individually mounted flaps of Junkers it is able to land as low as 62 m.p.h. Without doubt it is the finest transport Junkers has yet built.

Another excellent German creation (perhaps Germany *is* beginning to show signs of rapid advancement) is the new Henschel twin-engined fighter which is of the same general arrangement as our Curtiss A-18 attack planes except for an extra gun turret in the nose. The tail is of the double-rudder type and is right in the prop blast of the two Junkers Jumo 12-cylinder engines. There is also a gunner located in the "belly" to add to the rumpus in time of battle. The ship has very graceful and conservative lines and should prove to be a formidable weapon in Herr (mow 'em down) Hitler's air force. We might also add that the fighter is a mid-wing.

Further news has filtered in on Germany's "mystery" Heinkel low-wing pursuit which we mentioned some time ago. it is also powered by a V-12 Jumo 210 engine of 650 hp. These Jumo engines are so shaped that they give the engineer a good chance to show his streamlining prowess and the fuselage of the Heinkel is a typical example of the latest in bullet-like shapes. The wing is gulled and cantilever in the usual Heinkel style with parasite drag almost a minus quantity.

The upper and lower constituents of the Mayo composite aircraft have now been extensively test flown.

In France the Caudron-Renault C-690 pursuit, C-670 light reconnaisance and C-710 single-seater pursuit airplanes have been successfully test flown.

How to Build a Scale Model of the King's Cup Victor—The Percival Mew Gull

The Mew Gull has long been a contender in the King's Cup Race in Great Britain and has always been the fastest airplane in the race. However since it is a handicap event a Mew Gull has not won it until this year. There were three of them in the race this year but only two completed, those of Mr. Gardner's and Mr. Percival's. Mr. Percival's is the fastest of the three and has just recently been completed. Its wing has been clipped and a slight variation in fuselage design made possible a speed of 238.7 m.p.h. as an average for the long race. Mr. Gardner did 233.7 m.p.h. which is fast going for a ship powered by a 205 hp. Gipsy Six II engine.

All-wood construction is employed throughout with a DeHavilland-Hamilton controllable pitch propeller in the nose. The entire model should be built from balsa wood which can be purchased from almost any model airplane company. Follow instructions and plans carefully and take plenty of time. It is most important that you be accurate, and since the Mew Gull is such an easy model to build even the beginner should have no trouble.

Make the fuselage first as that is the most difficult part of the model. Draw the top view on stock with the grain of the wood running lengthwise and cut to shape with a jig-saw leaving about 1/16 inch excess to be shaved down with a small sharp chisel. Then draw on side view in correct position and likewise cut to shape. Go over the surfaces with coarse sandpaper. Using a sharp razor try shaving off the corners without cutting your fingers and make the contours look like the cross-sections of the fuselage on the plans. If you wish the cockpit may be hollowed out and a windshield built up from thin strips of balsa joined together with model cement. The fin and rudder will be made separately. Go over the entire model with first coarse and

then fine sandpaper.

Now forget the fuselage for awhile and try your luck with the left and right wing panels. Draw the plan view on a piece of wood with the grain running lengthwise or else you are apt to have a rather brittle wing. Be very careful with the wing panels, as with any slip of the chisel you will have one more permanent groove in the wing than you counted on. Cut around the outline with a jig-saw and then taper it down with a flat chisel as shown in front elevation of model. Then as shown by the cross-sections give it its streamlined shape. Do not try to make the trailing edge of the wing too sharp as, because of the thinness of the wood, the trailing edge would not be there very long. Anyway the trailing edge on the real plane is stubby. If you do mistakably get it precariously thin put on a light coating of cement to strengthen it and then lay weights on the trailing edge until the cement dries, otherwise it will warp and whoever heard of a racing plane with waving trailing edges? Go over the two wing panels with coarse and fine sandpaper and see that they fit snug on the sides of the fuselage.

Next on the program is the landing gear which is very simple to build but sometimes requires a little patience. Draw the side view of the pants on stock and cut to shape. Referring to the cross-sections finish them up, split them down the middle, making sure your best finger does not get under the razor blade. Hollow out the insides so a wheel can be housed and then cement the pieces together again. It is perhaps best to purchase the wheels though they may be made if desired. A small straight pin injected into the pants may act as an axle.

The propeller is most easily made and requires less profound language when the blades are made separately from sheet balsa and cemented to the spinner. Please note that the prop turns counter-clockwise.

The tail units (rudder, fin, elevators and stabilizer) are the easiest of all to make. Cut them out of sheet balsa with a razor blade and sandpaper to smoothness. Whittle out a tail skid and then begin the assembly.

Lay the fuselage in flying position on a flat surface and join the wing panels using plenty of ambroid so you will not have that embarrassing moment of having the wing fall off when showing it to some admiring friends. Put blocks under the wing tip to hold the correct dihedral angle. When connections have dried cement the tail units in place. After they have dried turn the model on its back and put on the landing gear. Using a straight pin as shaft stick the prop in the nose. Shape out an airspeed indicator and dynamic balances and put them on. Touch up all joints with cement again and smooth down the surfaces with fine sandpaper. Brush off all dust and then begin the paint job.

Paint the ship blue with white trimmings. Many coats will have to be applied before a smooth finish is obtained. It is best to sandpaper the model once more before the second coat is applied. Wait for the first coat to dry before applying a second one.

Secrets of "Successful Indoor "Prop" Operation

(Continued from page 21)

Several props similar to this one have been made since by the author, but with slight changes. One had about two-thirds as much camber. Another had just as

much camber as the original, but was given ¼" cutback instead of ⅛". However, even though they had better workmanship, neither of the new props was as efficient as the old one. The one with less camber appeared to have a poorer climb because of not "gripping" the air, while the prop with more cutback flared too much, so that it turned over very slowly under high power. It climbed very lazily, but since it was the finest of all in workmanship, the climb was continuous. However, it never attained sufficient altitude to "knock off" much duration. Such a prop might possibly be effective on an extremely light, efficient model.

The procedure used in making our 16" tractor prop may well be followed in general, especially on indoor props. First, select a clear block of 4½ lb. balsa. Here is the formula for determining what weight the balsa is.

$$X = \frac{108 \text{ times weight in ounces.}}{\text{cubic inches}}$$

In order to get the number of cubic inches, multiply the block length times the width times the thickness. Find the weight in ounces and fractions on your model scale. Solve the equation for X, and you will have the weight per cubic foot of that particular grade of balsa. For example, supposing you have a block 16x1½x1, and find that it weighs exactly one ounce. Multiplying 16x1½x1 gives 24 cubic inches. The equation then reads $X = \frac{108 \text{ times } 1}{24}$; solving, we have X equals 4½. Therefore, the weight per cubic foot of your block is 4½ lbs., or just what you want. Incidentally, this shows that a good indoor prop block containing 24 cubic inches should weigh one ounce. Blocks containing more or less cubic inches of wood should weigh in proportion; thus, an eighteen cubic inch block should weigh ¾ of an ounce, and a 30 cubic inch block should weigh 1¼ ounces. The block used in making this particular prop is 16¼x 1 9/16x1, and contains 25⅜ cubic inches. Its weight should be just about 1.05 ounces. Next, the quarter-grain lines should be examined. These should run at an angle of about 60° as indicated in the sketch. This will produce the greatest strength about one-third out from the hub, which is where most props tend to bend. Now cut the block into two triangular pieces as shown, and join the two halves overlapping about ¼". When dry, push a very fine needle through the exact center of the leading edge perpendicular to the surface, thus forming the hole for the propeller shaft. Rough out the concave side of each blade with your knife, taking at least half an hour per blade. At this time, it is well to remember that one of the tests of an expert is how *long* he can take on a prop. One should, therefore, take pride in working as slowly as possible, feeling happy as the hours go by.

Try to keep the blades close to one another in their progress; that is, as soon as one stage, such as sanding the camber, is complete on one blade, the other blade should be advanced to equal it. It is poor practice to practically finish one blade while leaving the other in a rough state. One of the two is bound to suffer in workmanship. So let them progress from step

to step together.

With medium sandpaper, remove the roughness of carving the camber, and then finish the concave side with 7-0 and 10-0 sandpaper. It is highly important to duplicate the camber exactly as shown at the various points on the drawing. Check the height of the camber at each position by laying a straight edge across the leading and trailing edges, and measuring down to the blade with a fine small steel rule. Near the hub it is especially of great value to have the proper *depth* of camber. The concave side should take from half an hour to one hour per blade to finish off to a high polish.

Next, rough out the convex side of each blade, using your knife to reduce the thickness of *3/32"* at the hub, tapering to *3/64"* at the tips. Set the handle of your knife on the edge of your work table, with the blade extending out over the side, cutting edge up. Balance the prop on the knife edge, and if one side is heavy carefully chip off enough to make it just right, testing it several times to make sure. It is practically impossible, of course, to get the prop to balance perfectly on the knife but one can tell closely enough to serve the purpose. Work carefully with the medium sandpaper, balancing the prop every five minutes or so, because you are now starting to thin the blades down to their final thickness. Begin at the tip and gradually thin down about one inch of the blade. Do the same to the other blade, and balance. Then work on the next inch and so on until you get to the hub. One of the best investments you can make is to go to your nearest 5 & 10 cent store and buy a small micrometer. You can get one there for 20 cents, and they are surprisingly accurate. After using one on this prop and on other parts such as motor stick blanks, wing spars, et cetera, you'll see what a wonderful help it is in building better models, because you can check things ever so much more carefully. Beyond a doubt, the future will find the micrometer just as important to the indoor model builder as his scale is today; so if you get yours now, you'll be a step ahead of most fellows. In fact, using the scale, the micrometer, and the balsa testing machine, we have the beginnings of a crude form of stress analysis, which has been dreamed of for years.

The thicknesses given on the drawing are an average of the two blades, since this prop was made before micrometers were cheap and easy to get. Surprisingly enough, there was for the most part very little difference between the two. But it certainly is an eye-opener to study those thicknesses, and see how easily they can be improved. It should be noted that the blades were "miked" at a distance about one-third back of the leading edge; forward of this position the thickness was increased, while closer to the trailing edge it was lessened.

Warp in the thin propeller blades is one of the biggest bugaboos facing the conscientious model builder. This can be corrected by checking the leading edge every few minutes. Ordinary warp, caused by sanding while holding the blades in an unnaturally bent position, can always be detected by sighting along the leading edge. If this edge appears absolutely straight, no warp is present; but if it has a gentle curve or bend, the warp may be corrected by holding the blade in such a position that the leading edge is straight, and breathing on it from the *inside* of the curvature you are trying to correct. The best thing to do of course is to avoid warp by seeing to it that, as you sand, the blades are not being bent or forced in any way. Local warp or wrinkles are caused usually by sanding a thin spot so fast that excessive heat is generated, swelling the wood and ruining the smooth face of the prop. The safest way is to sand carefully with fine sandpaper when the blade thickness gets below *1/32"*, instead of using the medium sandpaper to take off all the wood, and merely finishing with the fine. If care is used, no fine scratches need mar the surface of the completed prop. When working on the convex side, the sandpaper should always be used wrapped around a block of very soft balsa. Using a block in this manner always produces a more evenly sanded prop, and after you get used to it, you will find it good for the concave side too. Rest the concave side on top of your left index finger while sanding the convex curve. *Never* sand it resting on a flat surface, as this will warp and weaken it considerably. It is a good idea to exceed the amount of camber slightly, so that the correct amount will remain after the prop is shaped.

Balance the prop once more, and you will be ready to shape the blades. Use carbon paper to help you make an exact

copy of the template shown on the drawing, and trace around the template on the convex side of the prop. If you have a sharp pair of scissors, these will be found very handy for cutting the blade shape; otherwise, use a good razor blade. Finish off the cut edges to a knife edge with finest sandpaper. Be sure to leave a flat surface in the center of the trailing edge for the washers to bear against. After shaping, continue your careful sanding until the prop reaches a weight of about .015 of an ounce. The finished prop should weigh about .017 complete with shaft and washers. Balance the prop now for the last time, and then bend a hook as shown out of .014 wire for the shaft. Insert it in the prop, and bend the front ⅛" over at a right angle. Cement carefully, trying to fill the hole around the shaft with glue so that it cannot work loose. Do this on both the front and the rear. Next, take two copper or brass washers, 3/32" or ⅛" in diameter, with a hole just large enough to fit well on the shaft, and polish them on an oilstone. Although some may like to use light, very thin washers, it is the author's personal conviction that the more durable type is to be preferred because of smoother running and greater dependability. These can be "stoned" down to a weight of .0007 each. Slip them on the shaft, and then close the hook nearly shut, so that they can't manage to disappear while you're not looking. It is not necessary to glue the forward washer to the prop.

The propeller is now finished, except for one final detail which you may or may not wish to add. To help keep the prop clean, a coat of microfilm solution can be applied to the hub and out along the leading edge for an inch or two on each blade. The additional weight is quite negligible, and is more than balanced by the satisfaction of keeping a well-made

prop looking fit.

It is always fascinating and sometimes useful to speculate on what the future will bring, what the "next step" should be. For the past several years, it has been the thought of this writer that eventually the most efficient prop will be a double-surfaced microfilm one, with automatic variable pitch. The purpose of the variable pitch device is to keep the blades always working at their most efficient angle, as opposed to the ordinary fixed pitch propeller, in which the pitch that is chosen is really a compromise. To this end, we here in Chicago, especially Sidney Axelrod, who cannot be given too much credit for the unselfish manner in which he gave up many a chance to win contests, have studied and worked for over a year. At a recent meet, Axelrod, who has done all the development work on the designs originated by the author, brought out a 13" prop, double-surfaced with microfilm, and with automatic variable pitch, that weighed only .011 ounce complete with shaft and washers. The best record made thus far with this type of prop, which must be considered as still in its earliest infancy, is the 19 minute flight which won second place for Axelrod in the 1936 Mississippi Valley Indoor Meet.

N.A.A. Jr. News

(Continued from page 20)

to 6 ounces and retain 200 square inches wing area.

Q. Would you favor power shut-off in preference to a limited fuel allowance?

A. 31 stated that they would prefer the power shut-off, 30 stated that they would not prefer it, 5 voted for using both the above and 2 voted for using neither of them.

Q. What shut-off time would you recommend?

A. 16 suggested 30 seconds; 14 suggested 45 seconds; 8 suggested 1 minute; 3 voted for 40 seconds and 3 voted for 2 minutes.

Q. Would you favor reduction of gas allowance to 1/16 ounce?

A. 38 voted for the reduction and 26 were against it.

Q. To another amount larger or smaller?

A. 5 thought a larger amount would be better and 3 thought a smaller amount would be better.

Q. Would you favor an established boundary in which judges and timers must remain in clocking an official flight? This would of course make necessary a revision of world records, but in the end might prove more fair to all. It has been worked successfully in St. Louis for four years.

A. 45 were against establishing such a boundary for the judges and timers and 23 thought it would be well to establish such a boundary.

Q. Would you favor fewer events at the National Meet?

A. 46 were against having fewer events at the National and 19 preferred that there be fewer events.

Q. Other comments?

A. The various suggestions included in this answer were: places to get good food; more scales, etc.; regular inclusion of DuPont events at Nationals; more and better shop facilities; cheaper hotels; government help for National Meet; have only Wakefield, Bloomingdale and Texaco Events; keep gas jobs out of rubber contests; better and earlier preparation for next nationals; higher weight specifications and suitable runway for R.O.G. models.

Designing Your Gas Model

(Continued from page 13)

loading. A reduction in the wing loading will increase the *angle* of climb also.

On the other hand a low power loading may be assured by the use of a powerful engine compared to the weight of the plane. The whole problem of flight duration resolves itself into making the plane as light as possible compared to the wing area and as powerful as possible relative to its weight.

Let us summarize briefly the qualities of performance our plane should possess. First, it should fly slowly thus absorbing little power for flight and allowing an excess of power for climbing. (The power required for flight is proportional to v^3.) Second, it should have a high rate of climb and a low sinking speed. These qualities dictate a very light wing loading which means the model should weigh as little as possible and should have large wing area. A rapid rate of climb may be assured also by a low power loading or in other words, a lot of power compared to the weight of the model. This all boils down to placing a powerful engine in a light plane with plenty of wing area.

Now we are ready to see how the performance requirements can be fulfilled by designing the force arrangement and the physical proportions carefully.

In developing the design of a plane that will possess the required performance qualities to the desired degree, the same procedure may be followed that has been outlined for the design of a stability model. (Page No. 27, September, 1936, issue.) The factors of design should be determined in the following order to the end of producing a plane of great *stability* and *duration:* 1. Purpose. 2. The basic skeleton or arrangement of aerodynamic forces that act within or on the plane. 3. The type of model most suitable. 4. The size of the model. 5. The general proportions of the model and its component aerodynamic units that make up its complete structure. 6. The shape of the component parts or features of the model.

The *purpose* of the model has been decided upon. Being a gas model it must be extremely stable. As a contest gas model it must possess great duration qualities.

The next procedure is to arrange in diagram form the forces that will act on the model. This arrangement should be such that the interaction of the forces will induce complete stability and poise during all periods of a flight.

In order to determine how the forces should be arranged, let us consider the forms of stability that must be present.

These will indicate the proper force set up by their nature. The model must have lateral stability which may be insured by the use of wing dihedral; it must be stable longitudinally; it must be free of any spinning or spiral diving tendency which means that it must have directional and spiral stability. The forces that enter our problem are as follows:

1. The center of lift. 2. The center of gravity or weight of the airplane. 3. The line of thrust. 4. The line of resistance. 5. The center of lateral area. By placing these in their correct positions relative to one another complete stability can be obtained in any type of model.

Now let us see what can be done about this. Considering the relative position of the first two factors mentioned above, we find that lateral and longitudinal stability will be enhanced by placing the center of gravity as far below the center of lift as possible. In order to determine the actual distance between these two points, it is necessary to know the distance of the center of the stabilizer from the center of lift. Though the size of the model has not been determined yet, any convenient distance may be chosen for (M) and marked off on your drawing board, as indicated in the diagram No. 131. In order to illustrate the problem let us say this distance is 12 inches on our layout of forces. The whole layout can be scaled up to the proper size after the size of our model has been determined.

According to the rule of design governthe distance between the C.L. and the C.G., the C.G. should be about 1/6 the tail moment arm below the C.L. In this case this distance is (1/6 x 12) or 2 inches, on our layout drawing. This is an average amount for fuselage models. However, in gas model design the C.G. may be below the C.L., a distance equal to 20% to 25% of the tail moment arm. The greater the distance the more stabilizing effect will be produced, because of the pendulum action created by the C.G. being suspended below the C.L. In the famous KG gas model, the center of gravity was 23% of the moment arm below the center of lift. Let us choose this value for our example. Then the C.G. should be 2.75 inches below the C.L. (23% of 12 inches.) Now mark the C.G. on your layout at a point 2¾ inches directly below the C.L.

The next consideration is the position of the line of thrust relative to the C.G. This relationship affects the longitudinal stability and the attitude of the ship when gliding, to a very great extent. If the line of thrust is above the C.G., any possible stalling tendency will be reduced and when gliding the nosing up couple will be increased, relative to normal level flight. This is due to the fact that the C.G. is the pulling force in a glide. The C.G. pulling at a lower point during the glide than the propeller pulls on the line of thrust when the plane is in power flight, causes a nosing up tendency. Thus a flat floating glide is assured. The farther the line of thrust is above the C.G., the more effective this combination will be. However, if it is extremely high, close to the C.L., it is liable to come above the center of resistance. This condition will cause a nosing over effect during power flight unless the stabilizer is set at a negative angle to the thrust line in order to create a compensating nosing up moment. In other words, the best location of the thrust line is from ½ to 2/3 the distance between the C.G. and the line of resistance, above the C.G. as in Fig. No. 131. It is necessary therefore to determine the position of the line of resistance approximately if not exactly, before the line of thrust can be located definitely. In the average high wing or parasol plane the line of resistance is about 40% of the distance between the C.G. and the C.L. above the C.G. Then if the general rule of placing the line of thrust a distance of 1/12 of the tail moment arm above the C.G. is followed, the L. of T. will be about in the right position. At all events place the L. of T. as high as possible and yet leave a reasonable distance between it and the L. of R. (equal to about 1/3 distance between C.G. and L. of R.)

One might say that this distance between the L. of T. and the L. of R. is the measure of the nosing up effect and the tail buoyancy effect of the stabilizer; for the greater this distance is, the more positive the stabilizer may be set. The positive setting of the stabilizer gives it lift instead of causing a down pressure upon it which exists when the stabilizer is negative to the thrust line.

Now that the thrust line has been located, the skeleton of forces is complete, Fig. No. 131, except for the center of lateral area. This point should be located on a horizontal line passing through the center of gravity and slightly to the rear of it. In the case of rubber-powered models it should be

about 15% of the distance from the C.G. to the center of the stabilizer, to the rear of the C.G. In the case of gas models it should be located closer to the C.G. as the weights of this type of plane are centered closer to the C.G. In other words, the moment of inertia of the tail is less. Thus, less vertical area is required to the rear of the C.G. in a gas model. From practical experience it has been demonstrated that the C.L.A. should be about 10% of the tail moment arm (M), behind the C.G. In your diagram 10% of (M) is (10% of 12") or 1.2 inches. This is the minimum distance that should be tolerated. Make it more if necessary but not less. In order to prevent any tendency of the plane to "spin" this distance may be as great as 12% or about 1.5 inches.

It is all very well to say that the C.L.A. should be located at a particular point relative to the C.G. but after all, the location of this center is dependent upon the shape of the fuselage. In order that it may be located at a desired position it is wise to cut out a cardboard pattern of the fuselage with an outline that will please your fancy. This pattern should include the fin. Then after you have found the center of area of this pattern by balancing it on a pin, place it over your diagram of forces in a position that will bring the C.L.A. of the pattern over the C.L.A. of the diagram. Cut a small hole in the pattern if necessary so you may see when the two points are properly lined up.

Before you can do this however, you will have to know how great the distance is from the C.G. to the nose of the fuselage. In gas models it is usually equal to about 33% of the tail moment arm. In our example the latter is 12 inches, so (N) the nose length will be 4 inches. Now you can make your cardboard pattern 16 inches long.

When outlining the fin be sure and make it quite large. Oversize if necessary. Then if the C.L.A. of the pattern is to the rear of the C.L.A. on the diagram when the pattern is placed over the diagram in the proper position, some of the fin may be cut away until both C.L.A.'s are on the same vertical line. Of course when the final calculation of fin area is made, you may find that the actual C.L.A. is nearer or farther away from the C.G. than established by this preliminary location of it. This will not be important. The vital point is to establish the outline of the fuselage so that the C.L.A. is on a horizontal line passing through the C.G. The pattern should be shifted up or down and at various angles to the thrust line until the pattern's C.L.A. coincides with the C.L.A. of the diagram.

If you have made your estimates accurately when establishing the fuselage pattern outline, the fuselage will assume a normal position relative to the thrust line, the fuselage center line being parallel with the thrust line. Care should be taken when establishing the position of the pattern, that the nose is 4 inches ahead of the C.G. and that the thrust line emerges from under the nose of the pattern at a point that is convenient for the location of the engine shaft. As you probably know, the center of the engine shaft is the thrust

line.

You may find that the tail of the pattern must be lowered considerably in order to have the pattern's C.L.A. located properly. In other words, the longitudinal axis of the fuselage pattern will be at a positive angle to the thrust line. If such is the case we have what many builders call a negative line of thrust; (negative relative to the longitudinal axis of the fuselage.) Actually, putting negative thrust in a model is the same as lowering the rear of the fuselage below the thrust line. In effect this lowers the C.L.A. In other words, negative thrust tends to lower the C.L.A. to the proper position. If models require this for proper stability it is an admission that the C.L.A. is too high when the fuselage longitudinal axis is parallel to the thrust line and that the model has been improperly designed in the first place. Think this over. A plane need not have negative thrust if the fuselage is shaped so the C.L.A. is on a level with the C.G.

If the C.L.A. of your pattern will not line up with the C.L.A. of the diagram, when the pattern is in a normal horizontal position, (not with tail down), its shape must be changed or modified until the correct conditions exist. Add more area to the lower part of the pattern to lower the C.L.A. Often part of the fin is placed *below* the fuselage to produce a low C.L.A. In other cases the bottom of the fuselage is bellied down. At any rate make the pattern's C.L.A. slightly lower than the diagram's C.L.A., for the area of the lateral projection of the wing above the C.G. will tend to raise the C.L.A. of the whole airplane. The side area of the wheels and landing gear below the C.G., however, usually balances the side projected area of the wing above the C.G.

If the reader finds this system of establishing the C.L.A. too confusing, it is suggested that he read the description of the method given in Article No. 54, September, 1937, issue of MODEL AIRPLANE NEWS.

A greater variety of fuselage outline shapes may be tolerated in gas models than in rubber models, without bad effects, provided the designer knows his business. The reason for this is that the center of gravity of a rubber model is fixed once the model is built, because the motor or other parts cannot be moved without changing the construction of the ship. This is not true in the case of gas models however. In this type of plane the batteries and coil may be moved to change the C.G. position.

If a builder finds that the C.L.A. is too high, he can raise the batteries and spark coil and thus raise the C.G. to the level of the C.L.A. To be sure, this procedure may reduce the distance between the C.G. and the thrust line, but the undesirable effects produced by doing this is insignificant compared to the trouble caused by a C.L.A. that is very high. Perhaps the designer likes the looks of his ship when a cabin is built up under "his" high wing without regard to the fact that this *raises* the C.L.A. Designers have done this without raising the C.G. position to compensate for the raised C.L.A.

It is possible for the designer to choose one of a variety of fuselage outlines for his gas job if he is experienced enough to locate the batteries and coil so that the center of gravity will be in the correct position relative to the C.L.A. for his particular choice of design.

Next month it will be shown how you may choose one of a number of types of fuselages for your gas model and yet make it completely stable. Various satisfactory modifications of the force arrangements given here will also be described.

Gas Lines

(Continued from page 23)

land is part of Australia. It is an entirely separate country with no government connections with Australia. The population is about 1,600,000; the largest city is Auckland and the capital is Wellington.

Another fine flight picture, No. 5, has been sent to us by Ernest W. Harris of Armstrong, B.C., Canada. It shows his model taking off on one of the forty-five flights it has made. Mr. Harris has evidently kept a log of its flights, for he tells us that the total flying time of the ship has been ninety-five minutes. Though he has only put in small quantities of gas in the tank, the longest flight has been 5 1/4 minutes on a 2 1/2 minute engine run. The longerons and uprights of the fuselage are made of spruce so that the ship can take a lot of abuse. The only attempt has been a broken propeller and a bent landing gear.

At the recent California State Model Airplane Meet, Irwin G. Ohlsson of 630 North Alvarado Street, Los Angeles, Cal., emerged as winner with his latest model, the "Pacemaker." This little ship is shown in picture No. 6. It was the only entry in the meet to be given maximum points for engineering and design.

The duration of flight was judged on a thirty second motor run. The ship was in the air longer than any other plane. It is powered with an Ohlsson radio-mounted ⅛ horsepower motor. The wingspread is 68½ inches and it weighs 3½ pounds. The wing is made with an M-6 cross section and has a ten inch chord. The dihedral is six degrees, stabilizer area is 20 per cent and fin area is 7-1/3 per cent. The stabilizer moment arm is 30½ inches and overall length is 49 inches. A new method of mounting the motor has been used. It is mounted direct to the firewall of the plane in such a way it prevents any possibility of the plane catching on fire or being otherwise damaged while in flight.

Mr. William C. Caldwell of 67 Liverpool Street, Sydney, Australia, honorable secretary of the Model Flying Club of Australia, sends us picture No. 7, showing Mr. F. H. Cooper's plane, which won a Brown Junior motor presented by the Texas Co. (Australasia) Ltd., at the eighth annual flying exhibition. The models were judged for their appearance, take off, climb, flight, glide and landing. In spite of the fact that the contest was held on a very windy day, Mr. Cooper obtained eighty points out of a possible ninety.

Mr. Caldwell says that a question of design recently came up between Mr. Cooper and himself. Mr. Cooper contended that the balance of the machine, in order to determine the center of gravity should be made without the wings, inasmuch as the wings are the lifting factor and they are without weight in the air. Thus they should not be taken into account.

We wish to state here that Mr. Cooper is decidedly wrong in this. The wings certainly have weight in the air and their weight is supported by the lift force the same as the fuselage and the rest of the machine. However on many machines the center of gravity of the wings is very close to the center of lift, so that the weight of the wings causes very little change in the center of gravity of the plane when determined without the wings. If the center of gravity of the wings should be near the leading edge and the center of lift at the middle, the wings certainly would not pass through the air in level flight, but would dive suddenly. This dive would be caused by the pitching moment between the center of gravity and center of lift. If the wing was attached to the fuselage this pitching moment would be transmitted to the fuselage.

We hope that this will help correct Mr. Cooper's erroneous impression.

A picture of one of the neatest gas model jobs we have seen comes from L. S. Wigdor of La Rotonde, 2 Windsor Road, Finchley, N.3, England. It is shown in picture No. 8. This ship has a span of seven feet and weighs 3½ pounds. It is all balsa and flies at 15 to 20 miles per hour, powered by a Brown Junior motor. Mr. Wigdor tells us that the motor will soon be in its fourth year. He makes an interesting comment on the design practice of British engineers. It is:

"The thrust line in all drawings of

British aircraft is given relative to the datum line of the fuselage. This is the basic line horizontal around which the fuselage is built. Although the wing and tailplane angles are calculated with reference to the thrust line, they are always given relative to the datum line. This is done for the benefit of the ground engineer who rigs the aircraft.

"I hope this clears up that point, but the practice is one we are taught at college. Incidentally, British engineering is full of ridiculous little practices like that."

Picture No. 9 shows Bill Dunlevy of Lincoln, Illinois, and his six foot Taylor Cub gas job. He says it is an exceptionally good flier and its gliding qualities are the best he has ever seen in a gas model. The photo was taken at an N.A.A. meet held at Decatur, Illinois, on August 29th. Fifty-one gas jobs competed. Dr. G. E. Falkman was in charge. We are indebted for this information to Glen Courtwright of 515 Hamilton Street, Lincoln, Illinois.

Here we have a real treat for model fans. Picture No. 10 shows what we believe to be the most unusual gas job ever produced. It has extreme historical value as well. We wonder how many of our readers will recognize what it represents. We will tell you, however, in order not to keep you in suspense. It is an exact scale model of Bleriot's plane, in which he crossed the English Channel in 1909. Mr. Perry Snare of 1628 West 18th Street, Anderson, Indiana, its builder, is also shown in the picture. The outstanding part of all of this is that the model won second place in the "Bulletin" contest held on the Dr. J. C. Armington farm, south of this city. The model is driven by a Baby Cyclone motor and has a five foot wing span. It flew for 3 minutes, 29 seconds. The plane, on the first flight, landed in a thorn tree, which prevented it from competing again.

It appears that some of the old designers had the "right dope" after all. Apparently the improvement in model airplanes has not been in the line of design as much as in the field of the type of construction.

Last summer the International Competitions took place in France. The first was for petrol-driven model planes, which was won by Raymond Levy, who built his plane from the kit of a Scientific "Red Zephyr." Picture No. 11 shows a tense moment just before the take off of the flight of this ship which set a record in France of nineteen minutes. After this the plane disappeared in a cloud and was found thirty kilometers (about eighteen miles) from the starting point. It reached an altitude of about 3,900 feet.

Picture No. 12 shows a scale gas model of Art Chester's racing job. This model was built by W. G. Carroll of 2529 West 78th Place, Inglewood, Calif., and though it appears as if it is coming in on a glide, actually this ship has been posed by stringing it up on wires. Mr. Carroll tells us that he is a little afraid that this model is too heavy. He has just finished it and as yet it has not been test flown. The ship has a span of fifty-two inches and weighs about 2¾ pounds. It is powered with a Mighty Midget engine.

We would like to say that this weight is not excessive for a model of fifty-two inches span. The average gas model is loaded to about .6 to .7 per square pound of wing area.

John Pond of 435 14th Street, San Francisco, Calif., who is publicity director for I.G.M.A.A. Unit 244 and C. C. Thomas Navy Post 244, writes us regarding activities of this unit on the west coast. He says they recently held a gas model contest in which thirteen members of this club alone entered. Flights were made with 1/16 ounce of fuel per pound of weight. Pond further writes:

"Considering the day we had a very successful day. Our club is about the only one on the Pacific coast which goes in for large models so naturally we attracted quite a bit of attention. In spite of our large size models we get steep climbs due to the very light wing loadings we employ i.e., 1/6 to ½ lb. per. sq. ft. of area.

The winner was Nicholas Sanford, former president of the club, with the time of 17 minutes, 30 seconds. However, we have no picture of him available. Second place was taken by Alex Drobshoff with the time of 17 minutes. Third was John Pond with 15 minutes. The times would have undoubtedly been longer if the timers had followed the models but unfortunately we did not allow the timers to follow. Alex Drobshoff's model for instance, was picked up an hour and a half after it disappeared. Mine came down after 45 minutes out of sight, so you see our times could have been higher."

Picture No. 13 shows John's model, which won third place. The ship is a little beauty and has a very cleverly arranged cantilever landing gear, which you see. He writes he hopes to take the I.G.M.A.A. trophy away from Bassett in the near future.

He also says he is in doubt of the exact way to run an I.G.M.A.A. contest. We refer him to page 62 of the August issue. I.G.M.A.A. rules should be used; copies of which may be obtained from I.G.M.A.A. headquarters.

Picture No. 14 shows a model of Leo Weiss' streamlined gas job, plans for which appeared in the April and May issues of MODEL AIRPLANE NEWS. This plane was built by Edmund Rosenbergh of 841 Bond Street, Elizabeth, New Jersey. No data has been given concerning the performance of this ship. We will be interested to hear from Mr. Rosenbergh concerning this.

UNIT NEWS

Hawaii

Robert Fukuda of 320 B. Frog Lane, Honolulu, Hawaii, secretary of the Gas Model Airplane Club of Hawaii, Unit 91, sends use news of the "doings" of this unit in the mid-Pacific. He says:

"Our club has been active for some while now. The first gas model in the islands was built in 1932. However, they did not become popular until last summer. At that time, Ah On Au built the first model in the club. Since then, the craze spread rapidly and we are enrolling new members at the rate of about five every month. There is another gas club in the city, which should bring the total number of builders to about forty.

"Because of the size of the islands, our flights must naturally be short, but this does not handicap us at all. We have already lost one model somewhere in the pineapple fields. Our average flights are about ten minutes, which is just right to make it interesting, yet not have the models fly too far. We have almost every kind of engine here, including the Elf.

New Zealand

Guy S. Palliser of 8 Tulloch Street, St. John's Hill, Wanganui, New Zealand, acting secretary of Unit 93, the Model Aircraft Research Society, writes us:

"We have been given the use of a large electrically lit, gas heated and properly

(Continued on page 62)

Air Ways

(Continued from page 30)

difference between the two photographs is not as marked as in the originals. However, it suggested that model photographers use a red filter where extreme detail and excellent high tone is desired. Hilton has been experimenting along these lines for some time. The plane in the picture was colored yellow with blue lettering and stripes.

Picture No. 6 shows what is probably the most perfect display in the world of all the Thompson Trophy Race winners. The models were built by Charles E. Evers, Jr., 2164 Brown Road, Lakewood, Ohio. They have been constructed to a scale of ¾" to a foot. Mr. Fred Witt, advertising manager of the Thompson Products Inc., of Cleveland, Ohio, selected them as the finest set of these planes in existence. They were exhibited in a very prominent window, along with the Thompson Trophy, in a downtown store of Cleveland during the week of the National Air Races.

The total time required to build the complete set of eight models was 4655 hours. They are constructed of Balsa and Jap tissue, and are of the built-up type. All models have individually hand-carved pilot's busts except the "Mr. Mulligan." Each model also has complete instrument panels, movable control sur-

faces and full, accurately scaled engines, except the Caudron-Renault. "Mr. Mulligan" cabin incorporates opening cabin door, radio receivers, headphones, four seats, gas tanks, instrument panel and all control levers as in its prototype. The motor assembly on this model contains over 150 parts. The numerals "44" on both sides of the 1933 Wedell-Williams are cut from fabric obtained from the wreckage of the original ship, which was destroyed during the 1934 National Air Races at Cleveland. The construction of the planes follows their prototypes very carefully. Mr. Evers has been building models for 22 years. Perhaps this has something to do with the excellent job he accomplished in respect to these little ships.

We hear from another elderly (if we may say so) model building fan. He is Mr. William Withey of 613 Grove Street, Woonsocket, Rhode Island, and is thirty-seven years of age. He says that this should almost rate him for "second childhood." Evidently he feels that model building is well worth the twenty years he has spent on it. He is particularly interested in taking pictures of planes in flight, and has sent us picture No. 7, which shows his Lockheed Vega in action.

He also sent us a number of other remarkable photographs, but inasmuch as the planes were so high that they would not show in reproduction we will be unable to print them. Mr. Withey will welcome correspondence with other model builders.

MODEL NEWS FROM OTHER COUNTRIES

England

Picture No. 8 shows another phase of model building. It is a posed crash of two airplanes with the pilot bailing out in a parachute. Mr. D. F. Buist of 564 James Reckitt Avenue, Hull, Yorkshire, England, is responsible for this unique feature. He tells us that he has about forty models, including flying models, the largest of which is a Stinson Reliant of five foot wing spread. The parachute shown in the picture was purchased from a model supply company.

In order to take the picture with the models properly posed, they and the parachute were hung by fine thread from a rope stretched between two poles. The scene was then photographed against a sky background.

Philippine Islands

Picture No. 9 shows members of the "Singalong 9 Cylinder Club" of Manila, Philippine Islands. There are fifteen members in this club; eight in the senior group and seven in the junior. They are, front row, left to right: E. Dimalanta, P. Cafuncan Jr., F. Micaller. D. Mauricio and J. Q. Jimenez are sitting. Standing are: J. Bagtas, E. Fariera, A. Villareal, F. Menguez. We are indebted to Mr. Jose Q. Jimenez of 901 Dart, Interior 12, Paco, Manila, Philippine Islands, for this information. At present this club is very active, as well as other clubs in and around Manila. Considering the distance from centers of model interest they deserve a lot of credit for their work.

Italy

Mr. Enrico Barzetti ov Viale Reg. Marghinta 83, Ardenza, Livorno, Italy, sends us picture No. 10, which shows a group of interested model fans in Leghorn, Italy, during elimination trials in the National Contest. The picture was taken a few minutes before the members launched their models. The gentleman in the foreground with his back to the camera is Mr. Charles Favilla, president of the Leghorn Aeromodeller School. Model building in Italy is sponsored and encouraged by the government.

Australia

We hear from Harry Cooper of Rae Street, Roma, Queensland, Australia, who is Club member No. 996. He sends us picture No. 11, which shows his scale model of the China Clipper resting upon the surface of a lake near his home. From the details shown in the picture and the balance which it shows when on the water we can tell that this is a very excellent piece of work. He says he had a crash with it, broke the tail and wings, but soon repaired them. He now has a total of eighteen models built to the scale of ¼" to the foot.

In one of our recent issues news of Mr. Cooper's activities was given in Air Ways. Since then he has been swamped with letters from other Air Ways Club members from all over the world. He says:

"I cannot possibly answer all the letters received. I will try to get some of my pals to write answers to my pen friends. So, all those who do not receive a letter from me, please forgive me as I can only write with one hand. I would like to thank all those who wrote me through the Air Ways column."

Brazil

We hear from Mr. Hans Dunhofer of Rua Anita Garibaldi 23, Copacabana, Brazil, South America.

The model building bug appears to have bitten some of our South American friends. We hear from Mr. Hans Dunhöfer of Rua Anita Garibaldi 23, Copacabana, Brazil. He sends us picture No. 12. The Monocoupe 90-A shown in the picture was built by Mr. Dunhöfer's brother, Otto. However he, himself, has constructed a 15" Sparrow Hawk, a 22" Ryan S-T, a 60" Heath Parasol, as well as a number of flying models, including a Monocoupe and a Boeing P-26A. Hans' father manages a large store in Rio De Janeiro, and through the inteerst of his sons, has thought it wise to stock model airplanes and parts. Hans says up to the present time he has sold hundreds of kits, including several gas models. This club, the N.Z.M.A.A., is recognized by the New Zealand Aero Club as the only body governing the sport in that country. The New Zealand Aero Club is recognized officially by the Royal Aero Club of England and also the F. A. I.

Another statement which appeared in print, sent out by the Flying Club of Australia, was as follows:

"*Notice*—It will be seen that the Model Flying Club of Australia is the first and only organization to place flying in the

Commonwealth, New Zealand and Tasmania on an official footing."

Mr. Mackely says:

"Here again I would like to say that the above statement is entirely contrary to fact as regards model flying in the Dominion of New Zealand."

CLUB NEWS

New York

Mr. Harry C. Copeland, contest director, of the State Fair Model Airplane Meet recently held at Syracuse, New York, sends us information concerning the events run off and their official results. Three record performances were established. A full report follows:

Senior Outdoor Fuselage R.O.G. class C. 41 min. 30.5 seconds. Timed out-of-sight. Established by Wayne Fullmer.

Junior Outdoor Fuselage R.O.G. class C. 10 min. 22.6 seconds. Timed out-of-sight. Established by George DeLaMater.

Junior hand-launched Stick. Class C. 7 min. 44.2 seconds. Timed out-of-sight. Established by William Jackson.

These records are being submitted to N.A.A. for official verification.

It was estimated that over 600 people witnessed the meet which was broadcast over Station WFBL from 5:30 to 6 P.M. The winners were awarded their prizes at another broadcast from WFBL studio in the State Fair Grounds on Thursday, Sept. 9. The co-sponsors of the Meet, Syracuse Model Airplane Club and the Exchange Club had a Model Airplane Exhibit throughout the week at the Fairgrounds which attracted considerable attention and comment. All types of models were on display, including gas jobs. Models were constructed and a gas engine was mounted and demonstrated.

Gasoline-Powered Event

1. Edward R. Guth	Syracuse, N. Y.	27:7.2	Baby Cyclone Engine and Prop. awarded by Taylor-Young Airplane Co.: Model Airplane News sub.: Quart Berryloid Wing Dope.
2. Edwin S. Saul	Syracuse, N. Y.	22:7.5	Mighty Midget Kit awarded by Bunch Model Airplane Co.: Quart Berryloid Wing Dope.
3. Michael G. Hoyer	White Plains, N. Y.	17:35.8	Popular Aviation Trophy: Quart Berryloid Wing Dope.

Fuselage R.O.G. Event—Senior

1. Wayne Fullmer	Syracuse, N. Y.	41:30.5	Baby Cyclone Engine awarded by Aircraft Industries: Pair pneumatic wheels by M. & M. Model Wheel Co.
2. Martin Dotsko	Binghamton, N. Y.	2:14	Curtiss Robin Gas Model Kit awarded by Comet Model & Supply Co.
3. Bruce W. Winchell	Utica, N. Y.	2:4.4	State Fair Medal

Hand-Launched Stick Event—Senior

1. Joseph Caliolo	Albany, N. Y.	4:37.6	Trojan Junior Engine awarded by Trojan Miniature Products Co.
2. Martin Dotsko	Binghamton, N. Y.	4:30	State Fair Trophy.
3. Richard K. Barber	Utica, N. Y.	2:28.8	State Fair Medal.

Fuselage R.O.G. Event—Junior

1. George DeLaMater	Oneonta, N. Y.	10:22.6	State Fair Trophy; subs. Mod. Airp. News
2. Edward F. Ruch	Hornell, N. Y.	1:35.8	State Fair Trophy
3. Leon Kunicky	Hornell, N. Y.	1:0.5	State Fair Medal

Hand-Launched Stick Event—Junior

1. William Jackson	Hornell, N. Y.	7:44.2	Whitfield Paper Works Trophy; subsc. Model Airplane News.
2. Donald Jochem	Syracuse, N. Y.	5:21.4	State Fair Trophy
3. Edward F. Ruch	Hornell, N. Y.	2:56.9	State Fair Medal

Exhibition Scale Model Event

1. Max Sokol	Hamtramck, Mich.	Stinson Reliant	Exchange Club Trophy; State Fair Medal; subsc. Mod. Airplane News.
2. Jean S. Chadwick	Syracuse, N. Y.	Sikorsky S-39	State Fair Medal
3. Carlton W. Cooper	Cortland, N. Y.	Curtiss Helldiver	State Fair Medal.

Senior High-Point Winner

Martin Dotsko, Binghamton, N. Y., 10 points, Alex. Grants Sons Trophy for one year.

Junior High-Point Winner

George DeLaMater, Oneonta, N. Y., 9 points, Edwards Aero Club Trophy for one year.

Gas Lines

(Continued from page 59)

furnished room as a club room through the much appreciated generosity of the parents of a member. So far, we have not decided on a name for the club (it might be Wanganu Gas Modelplane Society) nor its officers, as the inaugural meeting is to be held next week. We will, however, have two temporary officers for a period of three months, when things will be revised, and a full board of Directors elected."

A second letter from Mr. Palliser says:

"We noticed from a recent issue of M.A.N. that we are not the first N.Z. unit, but we feel safe in assuming that we are the first North Island one. On Sept. 5th, at the annual general meeting, the name will be changed to the 'Model Aeronautical Research Society,' by unanimous vote. Also, after that date, Society letterheads will appear, which will mark another step forward."

Indiana

Eber Wilson of 621½ South Calhoun, Fort Wayne, Indiana, secretary of unit 95 of which Mr. Lloyd Clair, Y.M.C.A. Boys' Secretary, is temporary sponsor writes and tells some interesting news. The local "Y" is giving them a fifteen minute broadcast period on one of the local Westinghouse stations. Mr. Beaty has had this program for over a year and has devoted it entirely to model airplane hobbying. They are planning to announce the organization of their I.G.M.A.A. unit on this program. The unit has six gas models; and there are twenty in the vicinity.

Canada

Mr. Don Jacobs, Director of Model

Say "Merry Christmas" with a New Gift Every Month for an Entire Year!!

THIS is your chance to please your Pal with a new Christmas present every month for a whole year: a real present that will be appreciated and enjoyed by anyone interested in Model Aviation —man or boy. You can even give yourself this wonderful present, and save money by taking advantage of our

Special Holiday Gift Offer

MR. MULLIGAN 17 in.
A beautiful model of the 1935 Thompson Trophy Winner. Nicely balanced, will fly perfectly and give you a real thrill. A gift you will be proud of.

AERONCA-C70 17 in.
A new, beautiful, low wing model, very popular with all Model Builders. One of the most popular sport planes at the present time and a reliable, capable flyer.

MODEL AIRPLANE NEWS

—a full year's subscription—12 Big, 64-page copies of the "Only Magazine Devoted Exclusively to Model Aviation"—sent to any address you write on the coupon below; and as a

FREE X'MAS GIFT

—your *choice* of either of the two Complete Construction Kits to build the popular flying models shown at the left. Kits are complete with Plans and Instructions and all Materials to build either Model!

$1.50

Sent to any address (in the U. S. or Canada) you write on the Coupon below, with Holiday Gift Card from you as Donor.

Costs 20c a month on newsstands; you save 90c by subscribing for a full year!

EVERY Model Aviator wants MODEL AIRPLANE NEWS with its authentic news and information about all the worthwhile activities in this sport—full of new ideas, new plans, new action photographs of models and model builders from all parts of the world, with reliable, up-to-the-minute instruction on the latest developments in model aviation—all delivered every month in this big, lively magazine for Model Aviators of every age.

Send this fine magazine to your friend as a Christmas remembrance—it will be a real present he will welcome. Just tell us on the coupon below where to send the Magazine and the Free Gift Kit you select and we will do the rest—we will also send a handsome Holiday Card telling your friend that he will receive MODEL AIRPLANE NEWS for an entire year with your compliments. Do it now—fill in the coupon below, enclose $1.50 (Check or Money Order) and your Christmas Gift problem will be solved.

Model Airplane News provides endless enjoyment and practical knowledge on this great sport. No enthusiastic model builder will want to miss a single month's number. Every month presents a wealth of information about the most fascinating sport there is. Old and young alike are building Model Airplanes today — Gliders, Stick models, Solid models, Flying models, Exhibition models, and Gasoline Motored models. For the very latest news and reliable facts on this great sport, they all read MODEL AIRPLANE NEWS.

Gee!!
This Coupon solves my Gift Problems!
I'll give my friends Model Airplane News for Christmas!

MODEL AIRPLANE NEWS **MA-1**
551 FIFTH AVE., NEW YORK

Enclosed find $1.50 for your Special Holiday Offer. Send Model Airplane News for 1 year together with one of the Free Gifts as checked below.

☐ AERONCA (Check kit desired) ☐ MR. MULLIGAN

Send to .....

Address .....

City .....

☐ Check here if Gift Card is to be sent.

Name of Sender .....

CLASSIFIED DIRECTORY

Advertise in this directory for quick profitable results! Rate 10c per word. Minimum 20 words. REMITTANCES MUST ACCOMPANY ALL ADS FOR THIS DIRECTORY. Advertisements for the Feb. issue must be in by Dec. 10th.

MODEL AIRPLANES—KITS—SUPPLIES

DEALERS, Clubs, Schools wanted to help share the profits of our new Christmas list. A wholesale list of values beyond imagination. Send for your copy now. Capitol Aircraft Supplies, 113 Blake Avenue, Brooklyn, N. Y.

SENSATIONAL—Rush postcard for absolutely Free Flying Model Plan—Sample Balsa—folder Model Airplane Supplies, Kits, Motors. Mercury, 1592M, Lincoln Place, Brooklyn, New York.

RUBBER Thread—brown or gray—Hodgman Rubber Company, 261 Fifth Avenue, New York City. Chicago office: 412 South Wells Street. Dealers and Manufacturers only.

SEND 5c for list. Indexes: 366 Plans; 115 for Gas Jobs; Seven page "Low Speed Aerodynamics," etc. Jones Co., Box 31, West Brighton, S.I., N.Y.

SPECIAL—Soft needle valves, fit Cyclone motors—all models, 40c—3 for $1.00. E. Staif, 3739 Glenway Ave., Cincinnati, Ohio.

CHAMPIONS weigh their models. Beam Scale, assembled 50c. Weight to 1/1000 oz. Big Dealers discount. American Aircraft Supply, 174 George St., New Haven, Conn.

SAVINGS on model airplane supplies. Write for free price list. Dealers, Clubs. Our discounts mean real profits. Waterbury Model Builders Supply, 131 Cherry Street, Waterbury, Connecticut.

GAS MODEL Propellers. Beautifully Finished, True Pitch, Perfect Balance, 12", 13", 14". Each $1.00 P.P. Dealers attractive discount. Hornet Model Airplane Co., Fairmount & Milton Aves., Baltimore, Maryland.

RADIO CONTROLLED Gas Model, (12 foot wing). Complete plans, photos, instructions to build and fly from ground yourself! Send dime coin for full particulars to "Radiomation," Box 11, Cambridge, Mass.

READ THE ADS of Scientific, Peerless, Comet, Megow, Syncro Ace and Skymasters in this issue and order from us. We carry all the new kits in stock for immediate shipment. Free postage, model knife and catalogue with every order for $1.00 or more if you mention this ad. No C.O.D.'s. Catalogue only 5c. Model Aircraft Distributors, 2548 Nicollet Ave., Minneapolis, Minnesota.

DEALERS, Clubs, Schools: Send for low, complete wholesale list, including gas model supplies. Save money. Model Airplane Utility, 5307 New Utrecht Ave., Brooklyn, N.Y.

FREE Lapel Watch and propeller with every Ohlsson, Brown, or Syncro-Ace engine. Free price list. Arrow Model Company, 18 Austin Street, New Britain, Conn.

CUSTOM BUILT scale motors and cowls for any model or kit on the market. Send specifications for estimate. B. W. Laboratories, Box 85, Bradford Woods, Penna.

MODEL BUILDERS—It is now possible to control your gas model without expensive equipment. Write for information. O. L. St. Clair, Yamhill, Oregon.

FREE—Any two of the following 15" flyers: Bristol Fighter, Spad, Monocoupe, Curtiss Hawk P6E, Hell Diver, Beechcraft, Howard Ike, Boeing F4B4. Each kit contains full size plans, finished prop, wire wheels, rubber, stripe, printed sheets, cement, etc. Also special gift for promptness and new 1938 catalogue. Important: Send 25c for special packing and postage. H & F Model Airplane Co., 459 Bristol St., Brooklyn, N. Y.

MISCELLANEOUS

WINGS EMBLEM on black leather billfold. Your name engraved in gold. Pockets for cards, bills, etc. Send cash $1.50. W. Krosson, 36 Fillmore, Buffalo, N.Y.

Aircraft, has sent us the following complete report of the recent meet held in Toronto. It is:

"The Broadview Boys' Fall Fair Outdoor Model Aircraft Meet has now passed into the records for another year. The contest was held on October 2nd at the airport of the Toronto Flying Club, after postponement from Sept. 18th on account of high winds.

"The early morning weather gave promise of rain. High winds prevailed and a dull overcast sky looked exceedingly forboding. The pilot of the daily Meteorological Flight gave promise of clearing up in the east. Sure enough by about noon the sun came out and with it the wind subsided, and a crowd of approximately 2,000 people arrived to witness the event, which had been given considerable publicity in the local papers.

"The I.G.M.A.A. gas allowance proved very popular, inasmuch as duration was kept, and consequently no models were lost. It was so popular that contestants, in an effort to win the event, entirely neglected the power shut-off class."

PRIZE WINNERS IN BROADVIEW BOYS' FALL FAIR OUTDOOR MODEL AIRPLANE CONTEST

October 2nd, 1937

GAS MODELS

1. Jack Buck—(5:00⅜) $5.00 cash prize donated by Toronto Evening Telegram, and flight (in B.A. Eagle by Mr. Geof. Priestly) and B.B.F.F. Bronze Medal.
2. Vernon Anthony—(5:00) One hour flying instruction donated by Leavens Bros. Air Service, and one pint cement from Easybuilt Model Co., and B.B.F.F. Ribbon.
3. Harry Johns—(2:14⅜) B.B.F.F. Bronze Medal.

GAS MODELS (Power Shut-off)

1. Ray Hunter—Flight from DeHavilland Aircraft, and B.B.F.F. Medal.

California

The third semi-annual gas model airplane contest, sponsored by the Gas Model Airplane Association of Southern California, Incorporated, will be held on Sunday, December 19th, at Rosecrans and Western Avenues. Flying will start at 7:30 A.M. First, second and third prizes will be $50, $20, $10 respectively. There will be many merchandise prizes as well. For full information and entry blank write G. Carder at 1640 West 60th Street, Los Angeles, Calif. The contest is for Limited Duration.

New York

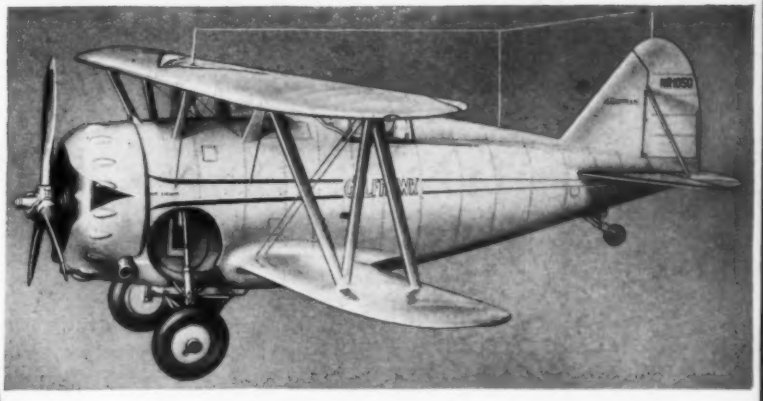
Mr. William Effinger of 53 Berkeley Place, Brooklyn, New York, writes as follows:

"I wish to thank you for the publicity given to us on the Quaker City Meet. However, you made a mistake on the photograph of the 'Super-Buccaneer.' The ship pictured in Gas Lines is Lieut. Flynn's 'Super-Buccaneer,' not mine. The ship which I flew was a 'Buccaneer-Standard,' which is a smaller edition of the same model."

Here's a CHRISTMAS SENSATION!

COMET

COMET presents The GRUMMAN Gulfhawk



A MESSAGE from Al Williams

Happy landing, fellows! Yes, and many happy hours while you're building this swell model of the GRUMMAN GULFHAWK. I know you will have a lot of fun building it, and flying it, because the method of construction outlined in the plan is so simple. It's a mighty faithful reproduction of the Grumman ship which was designed and built especially for my use. Go to it fellows and once more I say happy landings!

(Signed) AL WILLIAMS.

EXACT SCALE—1" = 1'0"

A SENSATIONALLY complete model of the Grumman Gulfhawk which was made to order for Al Williams! At every stage in the designing of this kit, the blue prints and details supplied by the Grumman Aircraft Corporation were closely followed. No guess work—no compromise—everything had to be perfect—and it is! All controls movable from cockpit. Landing light controlled from cockpit. Cockpit hood slides; shock absorbing tail wheel swivels and retracts. Landing gear also retracts. Many parts furnished complete or semi-complete; shaped struts, completed gas tank, shaped tail block, wheels and leading edges, even a decalcomania that dolls up the finished model like a million dollars! Highest quality selected Balsa and other material. Generous quantity of dope. A typical Comet value at only **$3.95**

Order from your dealer.

ENTER THE SCRIPPS-HOWARD GRUMMAN GULFHAWK CONTEST! $250.00 IN PRIZES—PLUS SPECIAL COMET AWARD!

Watch your local Scripps-Howard newspaper for details of the Grumman Gulfhawk model-building contest, with Al Williams as judge. $250.00 in cash prizes—and a special Comet award to the winners built from Comet kits! Here's one contest you want to be sure to enter—and you want to be just as sure to use the Comet kit for best results!

The COMET GAS MODEL

FEATURES: DETACHABLE wings and tail assembly. Wings "give" in event of collision, to protect them. ADJUSTABLE RUDDER and elevator setting. ADJUSTABLE MOTOR SKID accommodates practically every motor on market. Thrust line can be varied. SHOCK-ABSORBING LANDING gear and tail wheel—exclusive with Comet. Prolongs life of model by absorbing landing shocks. Monocoque type, used by largest transports, chosen because of light weight, structural strength, and ease of construction. CURTISS ROBIN chosen because of unusual inherent stability and excellent flyability. MOTOR SKID gives in event of collision—protecting motor. REMOVABLE COWL and hatches for easy accessibility to motor, battery and wing springs.

SPECIFICATIONS

MODEL—Curtiss Robin

WINGSPAN—6 feet

OVERALL LENGTH—46"

WEIGHT OF MODEL—2 lbs. less motor

Power—any 1/5th or 1/6th H.P. motor

WHEELS—3½ in. air wheels

A SENSATIONAL VALUE

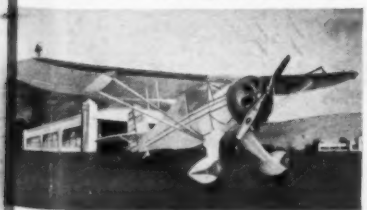
$4.95 less airwheels and motor

$6.50 with airwheels less motor

Postage—east of the Mississippi, 30c; west of the Mississippi, 50c; none if ordered from Comet Dealer.

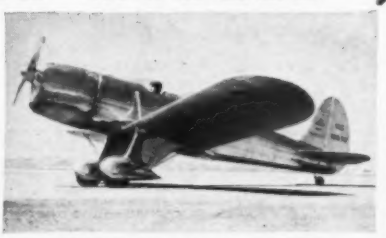
KIT—$2.50
BIG MONEY'S WORTH!
Complete set of plans, all printed balsa sheets and die-cut ribs. Postage 20c; none if bought from dealer.

NEW COMET FLYING SCALE MODELS—⅝" = 1'0"



Kit No. X-14—Monocoupe D-145
Wingspan 20", length 13"—$1.75

Kit No. X-13—Boeing P-26A
Wingspan 17½", length 14¾"—$1.95



Kit No. X-15—Ryan ST
Wingspan 18¾", length 13⅜"—$1.50

A new group of Comet scale models that every model builder will go "nuts" about! Full size, highly detailed plans drawn to exact scale. Lots of life-like realistic details; many finished and semi-finished parts, aluminum cowls, hinged controls, and a generous quantity of dope. Choose your model—then go ahead and have the time of your life building it!

COMET MODEL AIRPLANE AND SUPPLY CO.

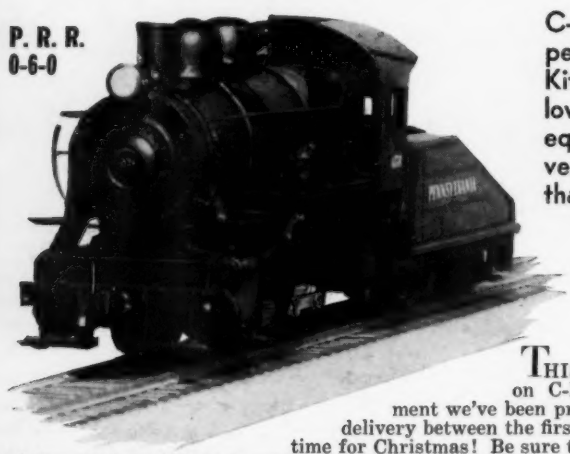
4809 W. Cermak Road, Chicago, Ill. 688 Broadway, New York, N.Y.
DISTRIBUTORS AND DEALERS EVERYWHERE

NEW! 3 new Comet 25"—25c kits! Howard DGA-9—Kit No. 2A-197; Waco Coast Guard—Kit No. 2A-198; Aeronca "K" Seaplane—Kit No. 2A-200. Also 3 new 16"—10c models, and 8 new ¼" scale 10c solids. See them all at your dealer!

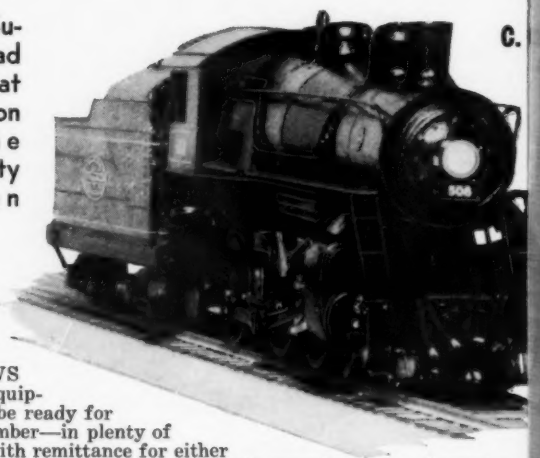
START A C-D SUPER MODEL RAILROA

Real Operating Model Railroading at Toy Train Pric

P. R. R.
0-6-0



C-D Operating Super Model Railroad Kits give you that low priced start on equipment of the very finest quality that you've been waiting for.



C.

THIS is the BIG NEWS on C-D operating RR equipment we've been promising. Kits will be ready for delivery between the first and tenth of December—in plenty of time for Christmas! Be sure to send your order with remittance for either of the sets listed below, to make sure you get yours on time. All orders shipped in rotation as received. We promise you a pleasant sur and an ease of construction totally unheard of before in the model railroad field. They're all for two rail operation to the 3/16" scal ⅞" gage (between tracks—so please do not use these locomotives to operate on toy or other size track). You can't go wrong with C

Only Finest Quality Materials Employed in All C-D Super Locomotive K

For instance, in die cast parts, we employ a die cast metal that's actually stronger than cast iron, yet capable of being trimmed with knife or small file. The hard wood turnings supplied are precision-made, in the very finest grade of white birch, and are not to be confused with the low priced amateur put-together train kit. The paper thin plywood, especially manufactured for us, employed for cabs, fire boxes, etc. is absolutely waterproof, being glued together with a phoenolic glue, and so good that it's even suitable for use on U. S. government air craft contracts! The brass worm and bakelite gear are finest quality to insure long, hard, trouble-free wear. The embossed sheets used for covering tenders, boiler front and other portions of the locomotive ha the rivet effects well raised and formed, gi VERY realistic effect.
But let the following detailed descriptions infor of the superiority of C-D Kits over all others. the above illustrations of our experimental could not do them justice.

Here's What You Get in the "C-D Super RR Line" of Locomotive K

1. MAIN FRAMES: Die cast. Axle and gear holes completed.

2. DRIVE WHEELS AND TIRES: Beautiful Die castings with fibre insulator strip between them so any weight of counterbalance supplied (3 or 4 per wheel) may be put on any wheel desired as these are cast separately—a C-D feature!

3. DRIVE WHEEL AXLES: Steel shouldered and quartered (no mistake can be made in mounting wheels).

4. SIDE RODS: Die cast.

5. MAIN RODS: Die cast.

6. CYLINDER BLOCK: Cut from wood.

7. VALVE GEAR: Parts are completely punched to shape and small rivets supplied for simple assembly of a real working model valve gear (link is die cast).

8. CROSS HEAD: Die cast with piston rod integral.

9. POWER TRANSMISSION: Special 30 or 35 to 1 brass worm and bakelite worm gear supplied with set screws.

10. MOTOR: Heavy duty A.C. 10 to 12 volts, reversible. May also be used on D.C. but not reversible by changing polarity.

11. REVERSE SWITCH KIT: All parts finished requiring only hand assembly.

12. MOTOR MOUNT: Stamped of brass, adjustable in all directions—extra sturdy.

13. BOILER: From front to fire box turned of clear hard wood with holes drilled in top to fit stack and domes which are also turned of hard wood well detailed where possible. Easy to sand to correct fillet shapes. Special embossed coverings with scale rivet heads supplied for fronts, smoke and fire boxes.

14. FIRE BOX AND CAB: Made of special .020 thick 3 ply wood. This comes printed out* and requires only cutting out with scissors and knife. This is a feature all model builders will like because it is easily glued together and **not soldered.** (You've almost all asked for more solderless methods, so here they are).

15. BELL: Turned brass realistically left natural color.

16. HAND RAIL POSTS: Turned Brass.

17. HAND RAILS AND PIPING: Brass rod supplied for these.

18. TENDER: Solid block of pine bandsawed to shape (this weight is needed when running train in reverse) requiring only a little sanding to finish. We supply a specially detailed covering for the tenders with the name of the railroad and scale rivets embossed to make the finest looking tender anyone could desire.

19. TENDER TRUCKS: Cast side frames, punche bolsters, shouldered axles, turned fibre insulating bushi die cast wheels. Only a short time is needed for assemblin

20. COUPLERS: Die cast, solid operating.

21. LEAD TRUCKS: On 4-6-0 only, die cast.

22. DETAILS: Headlight, smoke stacks, domes, rever cylinder, reserve tanks, generators, etc., are precision wood parts.

23. INSTRUCTIONS: We supply a large full size minu tailed C-D quality printed drawing with very explicit inst on all phases of construction.

24. AND TO COMPLETE THE KIT: Absolutely all screw bolts, rivets, washers, pipes, detail brass rods (three strips, etc., etc., also metal primer, cement and black—a ly everything needed except a few drops of solder and the assembling tools required. (For those who do not have small drills and 2 taps needed, we'll supply one set suit all C-D designs for only $2.25. Hand drill 45c, tap wre Parts packing charge 15c if not ordered with kit).

*When we use the term "Printed out," we mean the patterns are actually printed on the wood, eliminating out work, just start cutting when you open the kit.

P. R. R. 0-6-0 SWITCHER—KIT SRL-1

Kit, complete as described above, including motor and reverse switch, for only..... **$14.95**

Without motor and reverse switch kit..... **$10.80**

(Purchase these at any time, motor $3.50, reverse switch kit $.45)

C. G. W. 4-6-0 (10 wheeler)—KIT SRL-3

Kit, complete as described above, including motor and reverse switch, for only..... **$16.**

Without motor and reverse switch kit..... **$1**

(Purchase these at any time, motor $3.50, reverse switch kit $.45)

O-Gage Tinplate Uses! *The only way in which any C-D equipment may be used with tinplate "0" gage toy equipment (not ¼" or 17/64" scale equipment) is freight car bodies. By simply attaching trucks and couplers from toy equipment, C-D equipment will really "fit in" with the over-all length, width and height of tin "0" gage equipment. Locomotives could not be very well employed without considerable revamping, requiring your own ingenuity. Generally we recommend nothing but freight cars.*

1938 Catalog 10c
with Complete Present C-D Railroad Information—Ready about November 30—BUT Don't Let This Delay The Possibility Of Not Getting Your Locomotive—SEND YOUR ORDER TODAY.

Ordering Instructions: *If your dealer can't suppl order direct. All orders to our regular shipping terms. Send check or M.O. (cash risk). No C.O.D.'s. Canada, Mexico, British Isles, add 1 tra; all other countries, 20%. Include 10c for No. 3 Catal*
DEALERS: *Write at once for biggest profit opportun Model Railroad Kits and Supplies ever offered. Very discounts, and only small investment required. (Legitimate only).*

LOW PRICED "REP" RR MODELS

Send 10c for our 1938 catalog or see last month's issue, back cover for complete details on Rep freight cars, Hiawatha train and locomotives for only 25c to 95c—don't miss this!

See Our Big Ad on the Center Pages

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4508-B1 Lorain Ave. ★ ★ ★ ★ ★ **Cleveland, Ohio, U.S.A.**